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Contents.

(Over.)

Biol.
§ Evolution.
Philos.-Mor.
§ Do.
Theol.
§ Religion and Science.

1. Myall, William. The English evolutionists. 1881.
2. Mills, W. H. John Wesley an evolutionist. [1893.]
3. Hill, Thomas. Charles Darwin. 1888.
4. Romanes, G. J. Mr. Wallace on Darwinism
5. Fiske, John. The triumph of Darwinism. 187
6. Royce, Josiah. Is there a philosophy of evolution? 1889.
7. Hallock, L. H. Evolutionary ideas in creation. 1893.
8. Abbott, Lyman. Evolution and theology. 1885.
9. Warring, ———. Miracle, law, and evolution. 1888.
10. Cranch, C. P. Evolution and the moral ideal. 1891.
11. Hickok, L. P. Evolution from mechanical force. [1878.]
12. Johnson, F. H. Mechanical evolution. 1884.
13. Bowen, Francis. Malthusianism, Darwinism, and pessimism. 1879.

14. Newcomb, Simon, and others. Law and design in nature. By Simon Newcomb, Noah Porter, Joseph Cook, J. F. Clarke, and James McCosh. 1879.

15. Newcomb, Simon. Evolution and theology. A rejoinder [to the above]. 1879.

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multiplies more rapidly in a temperature of from 50° to 55° Fah. What the future of this surging throng will be no man can predict. What its present is, the census has revealed. Without indulging in the vanity of idle speculation as to the future, let us thankfully rejoice in the plenty and prosperity of the present.

ROBERT P. PORTER.

THE ENGLISH EVOLUTIONISTS.

THE doctrine of evolution in some form or other is as old as speculative thought; but it is only in its modern form that it has received the concurrent attention of all investigators, and has been made the fundamental postulate of science and philosophy. Since the "epoch making" publication of Mr. Darwin's celebrated work on "The Origin of Species by Means of Natural Selection," no thinker, either in science or philosophy, has been able to pursue his studies in independence of this idea. The desire to explain the existence of the world on some other than the creation-hypothesis, — a desire that had long perplexed many able and earnest truth-seekers, — had in some measure prepared the way for a doctrine that should attempt to substitute for the former belief in special acts of creative-volition a new doctrine that the present world of life and matter is the result of a process of evolution or development operating through the millions of years of the past history of the globe. To determine the nature of this world-process, to ascertain the laws by which this unfolding has been regulated, is the prime object of the new philosophy.

As briefly as we can state the modern doctrine, evolution in biology may be defined as the history of the successive steps of that morphological and physiological change or transmutation by which any living creature has arrived at those characteristics of form and function which at present mark its place in Nature. In its broadest significance, it includes all those theories which regard the history of the world as a gradual transition in time from the lower to the higher, from the worse to the better, from the simple to the complex, and from the uniform to the varied in functional and physiological structure, — the causes by which this variation is brought about being immanent or inherent in the thing which varies. It is in other words a process of "becoming," — a philosophical hypothesis of the origin and order of the world in which the growth and development of organisms are determined by or conditioned on the inorganic world; or, as we have seen it somewhere defined, it is, in biology, a perpetual readjustment of internal functions to bring them into harmony with external conditions, and as applied to the sum of things is the history of that series of mutations by which the present world-order has been attained. The modern doctrine is made to apply not only to physical, but also to mental development, — the growth of mind equally with that of organic functions being regarded as the result of material or mechanical processes. Professor Huxley thus states the doctrine: —

> "Those who hold the theory of evolution (and I am one of them) conceive that there are grounds for believing that the world, with all that is in it, did not come into existence in the condition in which we now see it, nor in anything approaching that condition. On the contrary, they hold that the present conformation and composition of the earth's crust, the distribution of land and water, and the infinitely diversified forms of animals and plants which constitute its present population, are merely the final terms in an immense series of changes which have been brought about, in the course of immeasurable time, by the operation of causes more or less similar to those which are at work at the present day."

Evolution is, in a word, an attempt to account, by natural causes, for the existence, the genesis, and the development of the world of life and matter which we see about us.

This, in its most succinct statement, is that doctrine of evolution which has recently attracted so much attention in the scientific world. It is in its present form essentially the creation of the last half of the present century. All previous speculation upon the subject had been merely the higher dreams of isolated minds, — the adventurous researches of master intellects along the lines of greatest light, — each thinker striking out for himself a path in the darkness, and evolving a world-theory out of his own consciousness. Building without that mass of evidence upon which the present doctrine is founded, their theories were mere conjecture, — they could do little more than guess at the truth; and inasmuch as the data from which they reasoned were meagre and insufficient, there arose among them a multiplicity of hypotheses conflicting in nature, and as numerous as the minds that conceived them. They groped hither and thither in the darkness, feeling around with eager hands, if perchance they might fall upon the truth; but, like somnambulists, they but staggered about, and jostled one another in their dreams. The ancient Hindu conceived the world to be an emanation from the divine nature, the eternal self-existent or self-created Brahma. The early Greek physicists believed it to have arisen from "primordial matter," through the operation of a certain inherent transmutative force resulting in constant morphological changes, — thus blindly staggering towards the conclusions which have been reached by the aid of modern scientific research.

Plato, and after him his great pupil Aristotle, made but little advance toward the new doctrine. They indeed had distinct ideas of an "evolution;" but their conception of the world-process was, in many respects, the very reverse of that which is now taught. It was their belief that the world had arrived at its present condition by a process of regression or degradation, rather than by one of progress or development, — the one starting from the most perfect, "the divine cosmos," and coming down the scale towards man and the lower animals; the other hypothecating a first self-acting agency, and regarding each remove from the original motive-power as a diminution in perfection. This latter conclusion seems to be one that would naturally suggest itself to the thinking mind in the absence of that mass of proof to the contrary which we now possess; but it may be said to be no longer an open question that the present cosmic order has been reached by a process of development, and not of degradation.

Of all the ancient philosophers, Lucretius seems to have come nearest the modern conception of evolution, inasmuch as he had ideas, vague and confused it is true, but sufficiently discernible, of the preservation of races by the operation of those causes now known as "Natural Selection," and of the gradual development of man from a condition approaching animalization.

Passing to the Scholiasts of the Middle Ages, we see no improvement of the doctrine. Indeed, the very conception seems to have been lost amid those vain and idle speculations in which the lives of the Schoolmen were consumed. In their hands truth was overwhelmed with error, and philosophy degraded into folly. The literature they have bequeathed to us is a vast repertory of useless learning, — of speculations beginning and ending in mysticism. Built upon nothing, and embodying little more than the vain imaginings of vain men, it is in many respects the most curious monument that industrious folly has ever erected to itself. But learning revived; Nature began to be studied. Copernicus and Galileo turned their attention to the heavens, and drew down knowledge from the skies; Kepler laid the corner-stone upon which has been reared the noble conception of the universal reign of law; Newton discovered gravitation, and published the "Principia;" and Bacon wrote, and turned the streams of thought into new channels.

With the revival of learning came new conceptions of the origin of the world. The Cartesian philosophy inclines strongly toward the idea of a physical evolution, but rejects the notion of mental development. Locke, notwithstanding his belief in direct acts of creation, did not a little to open the way to a conception of the new doctrine. In Germany Emanuel Kant, though rejecting the idea of evolution as a universal principle applicable alike to the moral and physical world, did nevertheless anticipate the Spencerian idea in many important particulars. The Kantian philosophy regards the cosmos as having arisen by the operation of physical laws; and these laws are thought sufficient to explain not only the order of the inorganic world, but also that of the solar system. In the organic world Kant was an advocate of the creation-hypothesis, and accounted for the various phases of animal life on teleological principles. He however recognizes the idea of human development, not as constituting a link in the great chain of the world-progress, but as simply a growth from a condition far inferior to man's present state.[1]

Ideas of evolution more or less clearly defined appear in most of the philosophical writings of the eighteenth century, but they seem for the most part to be dominated by conceptions of a theistic teleology. Philosophy appears to have been struggling to maintain an alliance with Orthodoxy; physical theories of the genesis of the world were guessed at, but they were stated with a timidity and want of confidence markedly at variance with the boldness which now characterizes the advocates of evolution. The tide however had set in, and nothing could now check the tendency of thought in this direction. Into every department of knowledge the close and critical researches of the student were carried; the intellectual world started into an activity such as had never been witnessed before. Those dreamy speculations concerning truth which had been the crowning distinction of the scholastic philosophy could no longer satisfy the curiosity of the explorer; there was everywhere felt a demand for a more certain and a more specific knowledge. Nature alone, it was thought, could yield such a knowledge; and in every direction Nature was being forced: the very bowels of the earth were being penetrated, if perchance truth might be found concealed amid the rocks. A host of new sciences based upon a study of Nature sprang into existence. The mighty sounding-line let down into the darkness of the past by geology and its attendant studies threw upon the history of the world a flood of light which revolutionized thought, and re-established the bases of science and philosophy. At last the problem of the inorganic world seemed nearing a solution. The vast rock-formations which underlie our soil, and even the little pebbles upon which we tread, were surrendering to human inquiry the secret of their remote origin, and of their gradual formation through the lapse of many thousands of years. Amid these formations, the fossil remains of extinct species occurring gave rise to the science of zoölogy, by which, as claimed by many, the animal life of the world has been traced back to a common origin; and the study of anthropology, showing a gradual development of man from a condition so barbarous and brutish as scarcely to distinguish him from the savage beasts which made his life a terror, has led the evolutionist to look upon man as only the last link in the great chain of organic development. The nebular hypothesis concerning the origin of the solar system had already been adumbrated by Kant, and fully developed by Laplace; physics and chemistry were being prosecuted with marvellous success, and the new studies of comparative philology and psychology were fast assisting to a fuller knowledge of man. Experiment after experiment had been made; museums were filled with the fossil remains of extinct species; their structure, their peculiarities, their relation to living species were carefully noted and tabulated, and science found herself overwhelmed by a mass of unsystematized and undigested facts. The time was now ripe for the new doctrine, and it soon made its appearance.

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[1] In making this short summary, I have been indebted to the very learned article on evolution by Mr. James Sully in the "Cyclopædia Britannica."

In 1859 Mr. Charles Darwin published his celebrated work on "The Origin of Species by Means of Natural Selection." No other book since the publication of the "Novum Organum" has had so profound an influence upon the world. And that influence was instantaneous. It spread abroad like light; and probably no doctrine so difficult and uncertain of proof, and so important in its bearing upon all truth and all knowledge, ever met so favorable a reception at the hands of scientists and philosophers. It is true that the "Darwinian Theory" was for a time, and indeed still is, a term of ridicule in the mouths of many; but we have lived to see it become the corner-stone of English and German philosophy, and have seen many distinguished societies for the promotion of science and philosophy admit its venerable expositor to membership in terms which seemed rather to indicate their belief that the honor they received from the connection was greater than that which they conferred. In the "Origin of Species" Mr. Darwin attempts to trace the evolution of the higher organic forms out of the lower, but does not in this work bring man within the operation of the laws of evolution. Indeed, it was not until this extreme view had been adopted by many thinkers both in England and in Germany, and had been specifically advanced by Professor Huxley in his work on "Man's Place in Nature," published in 1863, that Mr. Darwin finally published his second celebrated work on "The Descent of Man and Selection in Relation to Sex." In this work, which appeared in 1871, he applied his theory of the origin of species to man, placing him in the same category with other organisms, and looking upon him as the product of the same laws of progress and development. From 1831, when he took his degree in Christ College, Cambridge, Mr. Darwin has been a profound and earnest student of Nature, and began his career by a five years' voyage around the world in the capacity of naturalist. His industry and his intimacy with natural history were demonstrated, on his return, by a publication of an account of the voyage. Other volumes on zoölogy and natural history followed, and then came the work which has made him the central figure of modern philosophy. His extensive and varied researches into the mysteries of Nature had fully equipped him for the task. Through many years of patient investigation he had carefully collected facts and systematized evidence, ransacking Nature for testimony, and gathering proof from every quarter of the earth. Few men have ever brought to the illustration of any subject so vast and overwhelming a mass of facts. Zoölogy, botany, geology, anthropology, indeed every science which could bring him knowledge of the past or present history of the globe, was laid under contribution to his mind. It has been one of Mr. Darwin's characteristics never to be content with knowledge at second-hand; but he has preferred, so far as he could, to demonstrate everything for himself. To do this he has spared no labor; has travelled far and wide over the world; has made himself familiar with Nature in her wildest and most secret haunts, drawing their history from the herb and flower, and pursuing both animal and vegetable life back into the remote periods of the geological history of the earth. In this way he had mastered all the details of natural history; had familiarized himself with living and extinct species; studied their connection with and dependence upon one another, their points of similarity and difference; and had pondered long and deeply upon those physical laws by which, as he conceived, the development of species had been determined. With this preparation he set himself to the task of constructing a theory of the genesis of the world, building not as the earlier philosophers upon mere speculation, but upon what he conceived to be facts proven by actual experiment, and attested by the records of the earth with which he had made himself familiar. It is in this feature of proof that we see the chief difference between the philosophy of to-day and that of the past. It might almost be said that there has been more real progress in the last century than in any thousand years which preceded. Thought has become more vigorous; knowledge has increased more rapidly than ever before; facts are multiplying upon us with a rapidity which is bewildering; new truths are being constantly brought to the light; inventions and discoveries as marvellous as the creations of Arabian fable are pressing upon us on every side. Flushed with success and triumphant at every point, the mind is pushing its conquests far into regions which were hitherto supposed to be beyond the bounds of human knowledge. It has invaded Nature in her strongholds, and dragged up truth from the depths in which it had been concealed from the beginning of time. Almost daily some new discovery proclaims that Nature has surrendered another citadel, — that man has triumphed in another field of action. Never indeed was Nature so nearly subdued. Never before were her most hidden forces so well understood or so much in the power of man; he has made himself master of many of her laws, and has turned them to his uses; he has subdued her forces, and made them his servants and allies; he is fast penetrating her secrets and solving her mysteries, and by her assistance is approaching a complete knowledge of himself and his relation to the universe, to determine which must always be the highest and ultimate aim of human inquiry.

The amount of facts with which science is encumbered is an actual impediment to her progress. The scientific mind seems affected with a mania for experiment and investigation. Too many are searching after facts, and too few are trying to think these facts into system. The earth has been dug up, the heavens studied, all Nature ravished in the incessant search after something new; and the result is an immense accumulation of facts which no mind has yet been able to grasp in their entirety. Specialists have indeed mastered their respective branches, and by their contributions to knowledge have placed mankind under a debt of gratitude to themselves; but no intellect has yet arisen capable of generalizing this immense mass of heterogeneous knowledge into one complete and harmonious system of truth. To make such a generalization would indeed be the peculiar prerogative of the highest type of mind; and it may well be doubted if at present there exists a mind capable of such a work. If such a mind does exist, it belongs to Herbert Spencer. But Mr. Spencer has labored under the disadvantage of living at the time when these discoveries were being made, and these facts in process of accumulation; and it may well be questioned whether it is within the power of the human mind not to be confused by this infinite variety of evidence, and the rapidity with which it has multiplied. When the fever of experiment and investigation is ended, then those earnest and laborious seekers after truth, who after all are the only real benefactors of mankind, will sit down to the task of systematizing these facts, and culling out and rejecting whatever is false in this evidence; and when this is done, we do not doubt that there will appear a mind that will weld this knowledge together into a system of philosophy which will approach infinitely nearer the truth than philosophy has ever done before.

But returning to the proposition already stated, the old and new philosophies differ in nothing so much as in the method of their construction, — the latter being founded upon facts, and rising out of experience; the former founded for the most part upon speculation unsupported by proof. The philosophy of the past was little more than a system of metaphysics; that of to-day is essentially the philosophy of experience. The one dealing for the most part with mind and mental conditions, each thinker naturally gave to his theory the color of his own mental bias, and it was impossible to erect any system to which all might adhere; the other, founded in great measure on principles capable of proof, may reasonably hope finally to achieve such a result. It is no inconsiderable recommendation of the modern philosophy that it is one of evidence and proof. The advocates of evolution must admit, however, that the proof of their doctrine is yet very far from complete. Whether it will ever reach a full demonstration, owing to the nature of the proof necessary and to the difficulty of obtaining it, even the evolutionist does not venture to predict without great caution and reserve. But though the gaps in human knowledge should never be filled, it is certain that the theory of evolution has exerted as great an influence on thought as any other scientific or philosophical doctrine that was ever enunciated. Mr. Darwin does not claim to have originated the theory that has received his name, but merely to have elaborated it and fortified it by evidence; and though he may not be called either the strongest or most distinguished advocate of evolution, his influence in spreading the doctrine has probably been greater than that of any other man. Mr. Darwin has contented himself with the study of physical nature, and the effort to demonstrate the development of all physical organisms from a common origin. In his "Descent of Man" he places the human mind, in its lowest stages of development, in close relation to animal instinct; and assuming that there is an intimate relation between the mind and the physical organism without attempting to explain its nature, he concludes that as the body by the operation of physical causes is subject to indefinite changes, so the mind by the operation of similar causes is subject to equally indefinite modifications. This theory has been carried further by other thinkers who have dealt more largely with the mental problem than Mr. Darwin has ever done. The physical world has been his special province, and there he has labored with the true zeal of one enamored of truth, and willing to make any sacrifice for her sake. In the midst of popular derision, and subject to constant criticism, he has pursued his solitary labors, heedless of the praise or censure of men, and content if only he could commune with truth in her chosen temple amid the beauties and glories of Nature. His long life has been one constant sacrifice to knowledge, and science has had no more industrious or more zealous an advocate. The result of his labors must be peculiarly gratifying to himself, for he has lived to see his theory of the world adopted by the great body of the scientific school, and bidding fair to become the starting point of the philosophy of the future; and is doubtless conscious of having established a name which, like that of Aristotle and Bacon and Newton, will go down to posterity as the mark of a great epoch in the intellectual history of the world.

Mr. Darwin has recently been devoting much attention to the breaking down of the sharp line which has always been supposed to exist between the animal and vegetable kingdoms, and in his seventy-first year has just produced another work devoted to that purpose, — his object being to demonstrate the similarity between animals and certain species of plants, and to strengthen the proof which he thinks will finally be completed of the common origin of the animal and vegetable kingdoms. This work must of necessity prove a valuable contribution to the science of biology, and will stimulate others to explore this new and curious field. Mr. Darwin's theory has done much to unburden biology of the teleological idea, and has been a heavy blow to the doctrine of final causes. It is, however, thought by many not to exclude the idea of a first cause, and is therefore less objectionable to the theological world than is the more extreme doctrine of Mr. Spencer.

As much as the doctrine of evolution is indebted to Mr. Darwin, it might be said to rest under even greater obligations to Mr. Herbert Spencer. Mr. Darwin has dealt only with the physical aspect of the question; but Mr. Spencer, with true philosophical acumen, has considered it in almost every conceivable relation. No other single man has done so much as he to establish the doctrine upon a scientifico-philosophical basis, and to elaborate it into a complete and perfectly rounded philosophical system. No other man, indeed, has been so well prepared for so vast a work. Mr. Spencer is one of whom it is difficult to speak in terms which shall do him justice, and at the same time not appear to rate him more highly than he deserves. He has, not without reason, been considered the master intellect of this century, and it is not improbable that posterity will rank him as the greatest thinker who has appeared since Aristotle. Lord Bacon, in a letter to his uncle, Lord Burleigh, said: "I have taken all knowledge to be my province." Mr. Spencer could with equal justice say the same of himself; and the difference between the amount of his knowledge and that of Bacon's is almost equal to the difference between the amount of knowledge of the ages in which they lived. His mind might be likened to some magnificent garden in which have bloomed and ripened all the flowers and fruits of thought, or to a profound and shoreless ocean into which all the rivers of knowledge have poured their abundant riches. He has set up a kind of autocracy in the realm of philosophy, and from his intellectual throne has surveyed almost the entire field of human knowledge and human activity. We have compared him to Bacon, but they were alike only in the universality of their knowledge. Bacon's life was a melancholy spectacle of all that is greatest in human genius mingled in the same mind with all that is most unworthy in human character. In that vast intellect, which was capable of comprehending the universe, were antithetically mixed the true philosopher's love of truth and the scheming politician's unscrupulous disregard of plighted faith. Bacon thinking, deserves our greatest gratitude: Bacon acting, is worthy of our deepest scorn; and according as we consider him as a politician or as a teacher of mankind, his name is associated with all that is most contemptible or all that is most glorious in the history of the human mind. Mr. Spencer, on the other hand, may be said to have done nothing unworthy of himself. His whole life has been given up to the study of pure philosophy, and his vast powers of mind early placed him in the front rank of modern thinkers. His originality, his grasp of the broadest principles, his almost infinite powers of generalization, are the marked characteristics of his mental constitution. A close and earnest student, he has accumulated a fund of knowledge profound and accurate in character and almost "encyclopædic" in extent; and, worshipping Truth for her own sake, his private life, unlike that of the great Elizabethan philosopher, is such that philosophy will suffer no disgrace from association with his name. Mr. Spencer has been one of the most extreme advocates of the doctrine of evolution, and has carried it into the investigation of every subject, and has carefully elaborated an extensive system of philosophy upon this idea. There is scarcely any subject within the range of philosophy proper which he has not discussed, and whatever he has touched he has touched with the hand of a master. We may not accord with his views, but all must admit the consummate ability with which he has constructed his philosophical system. The briefest exposition of his doctrine or his method would carry us much beyond the limits of this paper. It may be said, however, that Mr. Spencer has laid much stress upon the great modern generalizations of the indestructibility of matter and the conservation of energy, resolving them into the one law of the persistence of force, which he makes the fundamental postulate of evolution. Evolution being a change from the homogeneous to the heterogeneous, an amount of homogeneous matter is assumed which, under the influence of this law of force and the law of the instability of the homogeneous, is set into that process of change known as evolution. An apt illustration of the process is given in the nebular hypothesis of the formation of the solar system, which hypothesis Mr. Spencer adopts. Basing his philosophy upon the deductions of science, he has adopted the mechanical theory of evolution as distinguished from the teleological idea; and, in the course of his investigations, attempts by this mechanical theory to account not only, as in the "First Principles," for the existence of the inorganic world, but afterward also for organic, mental, and social life. Everything is to Mr. Spencer the result of the laws of evolution. In his discussion of the development of organic life he has given great prominence to Mr. Darwin's doctrine of Natural Selection, or, as he terms it, the "Survival of the Fittest." For a number of years he has been engaged in the study of sociology, and is elaborating an extensive system of social philosophy upon the idea of social evolution. Society is regarded much in the same light as an individual organism, and its present condition is accounted for upon similar principles of evolution and development. In his opinion "Societies are products of evolution, assuming in their various times and places their various modifications of structure and function."[1]

It is scarcely possible that even Mr. Spencer's great abilities will be able to erect a true theory of social science. The problem is one involving so many difficulties and so many diverse and conflicting laws, that it seems quite improbable at present that the human mind will ever be able to work out its complete solution. That society has reached its present development by the operation of certain laws seems, in this age of the reign of law, much more probable than many other things that have received demonstration; but these laws are so multiform that many of them may forever baffle human research. No one has understood the difficulties of the problem more clearly than Mr. Spencer himself, and we cannot but experience a sensation of pain when we read in the closing words of the "Study of Sociology" his melancholy recognition of the insufficiency of even the highest powers to solve the great questions of life which present themselves to the mind. He says:

> "Thus, admitting that for the fanatic some wild anticipation is needful as a stimulus, and recognizing the usefulness of his delusion as adapted to his particular nature and his particular function, the man of higher type must be content with greatly modified expectations, while he perseveres with undiminished efforts. He has to see how comparatively little can be done, and yet to find it worth while to do that little; so uniting philanthropic energy with philosophic calm."

While, however, the social problem is one which even the best intellects may never thoroughly comprehend, much good will unquestionably result from a study of the laws by which society has been developed. It must certainly sooner or later affect the policies of rulers. It must also in some measure have its influence upon religious opinions. Extreme views both in religion and politics will no doubt be greatly modified by this study. For the social question is certainly one which may be understood infinitely better than it ever yet has been, and a fuller knowledge of its laws must inevitably effect an amelioration of the condition of mankind. As the social science is better understood, society must necessarily be established upon a better basis. Better laws will be framed, a broader humanitarian principle will be adopted, a healthier tone of thought will prevail, and a more rapid progress will be made toward that perfect society whose end shall be the greatest happiness and the greatest good of mankind. Viewed in this light, the study of society as the product of evolution must plainly be of great benefit to man, if the laws of its development can ever be ascertained even in part. That they should ever be fully understood is highly improbable; but they may be understood in great measure, and there can be no doubt that Mr. Spencer has already done much to simplify the problem. Yet, notwithstanding the eminent services he has rendered in this field of labor, his greatest claim upon the gratitude of posterity will be that he has demonstrated the existence of a social science, and has opened a path into this wilderness, and pointed out the road for future explorers to pursue. To mark out the paths of future thought, and draw the lines along which posterity shall walk in its search after truth, is indeed the special prerogative of the noblest intellects; and this Mr. Spencer more than any of his contemporaries has probably succeeded in doing. And his work seems to be far from ended yet. He is now in his sixty-first year, his constitution is strong and vigorous, his health robust; and altogether there seems no reason why he should not yet have many years before him to devote to those immortal labors which have made his name a familiar sound wherever science and philosophy are known. Yet it must be admitted that his philosophical system is far from complete. Indeed, he has laid its foundations so broad that it is impossible a single mind should ever be able to complete so stupendous a structure. Like the celebrated historian of civilization, he has undertaken a task which no man will ever be able to perform alone. He has endeavored to compass all knowledge, and to systematize all experience. Unwilling to recognize that there are bounds to human will and human intellect, he has gone on piling up the successive stories of the great temple of philosophy which he is building; but long before the last touches are given his life will be exhausted, and other hands will continue what he has begun. Much that he has built will no doubt be torn away and replaced by something new; but it will be enough for his fame if only the foundation which he has laid shall have been laid upon truths that will endure.

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[1] Study of Sociology, p. 399.

Among the English evolutionists, Professor Huxley must not be forgotten. Though now only in his fifty-fifth year, he has long held a prominent position in the scientific world, and is said to have been the first to extend Mr. Darwin's theory of the origin of species to man. Like Mr. Darwin, he has devoted himself almost entirely to a consideration of the physical side of the question. For some years he has been devoting much attention to the comparative anatomy of the vertebrata, and zoölogy is indebted to him for many important discoveries. He is a vigorous and original thinker, a laborious student, and a strong advocate of evolution. His work on "Man's Place in Nature," in which he brings man within the scope of the Darwinian theory, is probably his best known work on evolution. In 1868 he delivered a lecture on the "Physical Basis of Life" which attracted much attention. In this lecture he claimed that there is a certain kind of matter from which all the life of the globe has sprung. This matter he calls *protoplasm*, and claims that it is the product of the union, under certain conditions, of certain compounds, — water, ammonia, and carbonic acid; that this protoplasm forms the basis of all life; and that all life is therefore of kindred origin and kindred character, from the lowest plant to the highest animal.

Associated with the name of Professor Huxley is that of Professor Tyndall. Probably no one of the English scientists is better known either in this country or in Europe. Professor Tyndall is, in the strictest sense of the words, a physical scientist. His labors have been chiefly an examination into the molecular constitution of matter. He has made many important discoveries both in electricity and in radiant heat. He has also devoted much attention to a consideration of the causes which affect the "acoustic transparency of the atmosphere," and his work on "Sound" has been translated into Chinese at the expense of the Chinese government. Professor Tyndall is a thorough-going evolutionist. He has written much and delivered many lectures, and has probably done more than any one else to popularize science. He is peculiarly fortunate in his style of writing, which is at once clear, beautiful, and powerful. Indeed, in this respect he may be said to stand at the head of the whole school of English science and philosophy, and it is difficult to find a better or more pleasing style even among those who have made the rules of composition a study of their lives. Darwin, Spencer, Huxley, and Tyndall are the four names that are most intimately identified with the English doctrine of evolution. Many other eminent thinkers, however, have advocated the same doctrine, and notably Mr. Bain, Mr. Lewes, Mr. Fiske, Mr. Murphy, and Professor Clifford. These have for the most part attempted to give a metaphysical interpretation to the doctrine. It might with some justice be said that the whole body of the English scientists and philosophers have in some form or other accepted the evolution hypothesis. The four names first mentioned, however, are those which are most intimately associated with the idea. Of these, Mr. Darwin seems to have had the greatest influence on the Continent, and particularly in Germany. Indeed, the whole of the modern German philosophy seems to have risen upon the Darwinian or physical conception of evolution ; and Mr. Spencer, who has done more than any other thinker to elaborate the doctrine, seems to have exerted but little influence upon German thought. We may, however, predict that he will be rated more highly by posterity than any of his contemporaries, for he has extended his investigations over a wider territory, has thought more profoundly, has opened up greater fields of inquiry, and has embodied in a philosophical system for the use of future explorers the vast acquirements of a mind that has gathered fruits from all the fields of human thought, and whose resources seem limited only by the limits of knowledge.

In concluding this paper it may be proper to repeat and to examine the statement already made, that the new philosophy, by which we would designate the philosophy of evolution, is based upon actual scientific research. It is, so far as it has been clearly made out, a philosophy of proof; and this might be called the chief feature which distinguishes it from the philosophy of other ages. Whatever may be the result of the investigations now making in this direction, it is at least much that an attempt has been made to establish philosophy upon a scientific basis and to subject its conclusions to the test of proof. This age, indeed, is one in which it is difficult for any doctrine to stand unless supported by strong evidence of its soundness. And this I regard as an indication of an extremely healthy mental condition. There is everywhere a great desire to know the truth, and a determination to accept nothing which has not been subjected to a close and searching scrutiny. The opponents of science, if any exist, do not demand stronger or more certain proofs of the truth of any new scientific doctrine than does the scientist himself. And this is proper, for scientific knowledge should be fixed and impregnable; and while this desire to know the truth and this spirit of universal criticism continue, we may reasonably expect that great progress will be made in all the branches of knowledge. We may expect, too, that knowledge will be established upon a better basis than heretofore; that it will be more certain and less subject to fluctuation, — for what has been established by proof and demonstrated to be true must be true forever. The evolutionists, therefore, by giving their doctrine a scientific basis and subjecting it to the test of proof, have taken the only method by which such a doctrine could ever be satisfactorily established; but it cannot be claimed even by the most extravagant advocates of evolution that the proof already obtained is sufficient. On the contrary, it must be admitted that it is very far from complete. There are immense gaps in our knowledge of the world, and particularly of the animal life of the world, which must be filled up; and the proof necessary to fill these gaps is of such a character that it may well be doubted whether or not it can ever be obtained. It seems impossible, also, that the existence of mind can ever be accounted for upon a purely physical or mechanical conception of the idea of evolution, if we suppose the mind to be something different from and independent of the physical organism. And even though by future investigation these gaps in our knowledge should all be filled, and we should come to a clear understanding of the universal interdependence of species, and be able to demonstrate the gradual evolution in time of all animal life from the lowest to the highest forms, we should still be unable to explain that "first principle" of life from which all living organisms had been evolved. So that the doctrine of evolution, even admitting all that Mr. Spencer claims, still leaves us ignorant of the beginning of life. It takes us only to the door of the temple, and leaves us there anxious and pleading to know, yet able only to guess at, what is concealed within. Professor Huxley, as we have seen, has attempted to account for the beginning of life upon scientific principles; but it is safe to say that in the present state of knowledge no satisfactory demonstration of this character can be made. What the future will achieve in this direction may not be predicted; but we may express a doubt whether we shall ever be able to form any other than a teleological conception of life. In his biology, Mr. Spencer does not attempt to solve the question of how life first arose, but assumes its existence, and considers merely its development into higher forms. And this is the most that the evolutionist at present can hope to do. He may attempt to trace the progress of life, but he may not explain to us the secret of its first beginnings; and even though Mr. Darwin's theory of the origin of species and descent of man should be fully established, still we shall find ourselves asking but receiving no answer to the question, "What is life?" Still we shall not know whether, as claimed by some, it is merely a continuation under other forms of sub-vital processes, or whether it is something complete in itself and wholly independent of physical causes. In a word, the evolutionist must assume a beginning of life, and admit that he is unable to explain it; so that after all the question of life seems, even from the standpoint of the evolutionist, to resolve itself back into the idea of a first cause and a creative will. Many have found in this view a footing upon which to build a religious interpretation of the doctrine; for it is argued that if the doctrine of evolution is true, its effect is not to destroy the belief in a first cause, but merely to remove that cause further from us than we have heretofore conceived it to be. Just as a wheel started from the top of a hill and rolling with increasing velocity towards the plain owes its motion to the hand which gave the original impulse, so in this conception of evolution the world-progress is referred back to the hand which first started Nature in her course of change. So, too, the doctrine is thought by some not necessarily to exclude the idea of a future life; for even conceiving the mind to have arisen by a gradual evolution, there may, it is thought, be reached a degree of mental development which might qualify the mind to live when the physical organism has expired.

But whatever other influence the doctrine may have, it is quite certain that it will lead in the future to a more careful study of man as man and as related to the sum of things. To solve so vast a problem is the highest object towards which human energy can be directed. It is, indeed, the ultimate aim of all philosophy. And as we acquire a broader knowledge of ourselves, we shall at the same time become more intimately acquainted with the means by which our happiness is secured. We shall better understand our relation to society and to mankind; and recognizing that the highest good of the species is the highest good of the individual, we shall learn to live less for ourselves and more for humanity. The result must be that a more altruistic spirit will prevail; the question of self will, in a greater measure than before, be lost in the question of race, and the energies of all will be directed towards the accomplishment of the evolutionists' dream of the perfect state, — the highest development of the species. If there is any principle which more than any other recommends the new philosophy, it is that it is essentially the philosophy of humanity; and though in the progress of knowledge it should be demonstrated that the principles upon which it is founded are fundamentally erroneous, it still will not have existed in vain, if, by directing thought into new channels and opening other fields of investigation, it has increased human happiness by bringing man to a better knowledge of himself.

WILLIAM MYALL.

THE REFORM IN PRONOUNCING LATIN.

FOR some years past there has been much and earnest discussion as to the necessity of a reform in the pronunciation of Latin. In 1857 Professor Corssen issued his great work. It was by far the most profound and scholarly treatise on that subject which had ever appeared, and it brought before the public an almost incredible mass of information with regard to the history and growth of the Latin

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Darwinism
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From The Contemporary Review.

MR. WALLACE ON DARWINISM.

BY GEORGE J. ROMANES, F.R.S.

To all who have read the life and letters of the late Mr. Darwin it must appear that, over and above the personal and scientific interest which attaches in so high a degree to that admirable biography, there is what may be termed a dramatic interest. The antecedents of Charles Darwin, the Sir Isaac Newton of biology, in Charles Darwin, the undergraduate at Cambridge — hitherto unconscious of his own powers, and waking up to a love of science under the guiding influence of a beautiful friendship; the delight and the diffidence which attended his nomination by Professor Henslow as a suitable naturalist for the Beagle expedition; the uncertainty which afterwards marked the course of negotiations between his family on the one hand, and the Admiralty on the other, wherein issues of incalculable importance were turning and re-turning in the balance of chance, determined this way and that by the merest featherweights of circumstance; the eventual suddenness of a decision which was destined to end not only, as his father anticipated, in an "unsettling" of his own views, but also, and to a never paralleled degree, in the unsettling of the views of all mankind; the subsequent dawning upon his mind of the truth of evolution in the light of his theory of natural selection, and the working out of that theory during twenty years of patient devotion in the quiet retirement of an English country life; the bursting of the storm in 1859, and all the history of the great transformations which have followed, — these in their broadest outlines are some of what I have ventured to call the dramatic elements in the records of Mr. Darwin's life. Now, not least among these dramatic elements is the relation in which Mr. Darwin's work stood to that of Mr. Wallace. For assuredly it was in the highest degree dramatic, that the great idea of natural selection should have occurred independently and in precisely the same form to two working naturalists; that these naturalists should have been countrymen; that they should have agreed to publish their theory on the same day; and last, but not least, that, through the many years of strife and turmoil which followed, these two English naturalists consistently maintained towards each other such feelings of magnanimous recognition, that it is hard to say whether we should most admire the intellectual or the moral qualities which, in relation to their common labors, they have displayed.

Now, I have sought to lay emphasis on this the dramatic side of Darwinism, because in the work which under this title I am about to review, it appears to me that Mr. Wallace has added yet another scene, or episode, which, in the respects we are considering, is quite worthy of all that has gone before. I do not allude merely to the fact that in this work we have the matured conclusions of the joint originator of Darwinian doctrine, published most opportunely at a time when biological science is especially anxious to learn his views upon certain questions of the highest importance which have been raised since the death of Darwin; nor do I allude merely to the further fact that in now speaking out, after nearly a decade of virtual silence on scientific topics, the veteran naturalist has displayed an energy of investigation as well as a force of thought which is everywhere equal to, and in many places surpasses, anything that is to be met with in all the solid array of his previous works. That these facts present what I call a dramatic side I fully allow; but the point which in this connection I desire to bring into special prominence is the following.

It is notorious that, from the time when they published their joint theory of evolution by natural selection, Darwin and Wallace failed to agree upon certain points of doctrine, which, although of comparatively small importance in relation to any question of evolution considered as a *fact*, were, and still continue to be, of the highest possible importance in relation to the question of evolution considered as a *method — i.e.*, in relation to the causes or factors which have been concerned in the process. It was the opinion of Mr. Darwin that natural selection has been the chief, but not the only, cause of organic evolution; while in the opinion of Mr. Wallace natural selection has been the all and in all of such evolution — virtually the sole and only principle which has been concerned in the development both of life and of mind from the amœba to the ape — although he further and curiously differs from Darwin in an opposite direction, by holding that natural selection can have had absolutely no part at all in the development of faculties distinctively human. Disregarding the latter and subordinate point of difference (a re-presentation of which in the concluding chapters of his present work I may however remark appears to me sadly like the feet of clay in a figure of iron, marring by its manifest weakness what would otherwise have been a completed and self-consistent monument of strength), let us first clearly understand to what it is that the major point of difference amounts. This may best be done by quoting from each of the authors in question parallel passages, which occur in the concluding paragraphs of their latest works.

Mr. Darwin writes: —

> I have now recapitulated the facts and considerations which have thoroughly convinced me that species have been modified during a long course of descent. This has been effected chiefly through the natural selection of numerous successive, slight, favorable variations, aided in an important manner by the inherited effects of the use and disuse of parts; and in an unimportant manner, that is in relation to adaptive structures, whether past or present, by the direct action of external conditions, and by variations which seem to us in our ignorance to arise spontaneously. It appears that I formerly underrated the frequency and value of these latter forms of variation, as leading to permanent modifications of structure independently of natural selection. But as my conclusions have lately been much misrepresented, and it has been stated that I attribute the modification of species exclusively to natural selection, I may be permitted to remark that in the first edition of this work, and subsequently, I placed in a most conspicuous position — namely, at the close of the Introduction — the following words: "I am convinced that natural selection has been the main, but not the exclusive, means of modification." This has been of no avail. Great is the power of steady misrepresentation; but the history of science shows that fortunately this power does not long endure.

Mr. Wallace writes: —

> While admitting, as Darwin always admitted, the co-operation of the fundamental laws of growth and variation, of correlation and heredity, in determining the direction of lines of variation or in the initiation of peculiar organs, we find that variation and natural selection are ever-present agencies, which take possession, as it were, of every minute change originated by these fundamental causes, check or favor their further development, or modify them in countless varied ways according to the varying needs of the organism. Whatever other causes have been at work, natural selection is supreme, to an extent which even Darwin himself hesitated to claim for it. The more we study it the more we are convinced of its overpowering importance, and the more confidently we claim, in Darwin's own words, that it "has been the most important, but not the exclusive, means of modification."

Now, in the latter quotation it is manifest that the "co-operation" which is spoken of takes cognizance only of factors which are themselves either necessary conditions to, or integral parts of, the process of natural selection; and, therefore, the approval which Mr. Wallace bestows upon Mr. Darwin's emphatic reservation ("but not exclusive means of modification") can only be understood to have reference to the development of those distinctively human faculties which he immediately proceeds to consider, and touching which, as already indicated, Mr. Darwin's reservation was certainly not intended to apply. Thus, in brief, at the time of Mr. Darwin's death the state of matters was this: while Mr. Wallace held persistently to his original belief in natural selection as virtually the sole and only cause of organic evolution, the whole body of scientific opinion, both in this country and abroad, had followed Mr. Darwin in holding that, while natural selection was "the main" factor of such evolution, nevertheless it was largely supplemented in its work by certain other subordinate factors, of which the most important were taken to be the inherited effects of use and disuse, together with the influence of the environment in directly producing alterations both of structure and of instinct.

Shortly after Mr. Darwin's death, however, this state of matters underwent a very serious change. For it was shortly after Mr. Darwin's death that Professor Weismann began to publish a remarkable series of papers, the effect of which has been to create a new literature of such large and rapidly increasing proportions that, with the single exception of Mr. Darwin's own works, it does not appear that any publications in modern times have given so great a stimulus to speculative science, or succeeded in gaining so influential a following. The primary object of these papers is to establish a new theory of heredity, which has for one of its consequences a denial of the inherited effects of use and disuse, or, indeed, of any other characters which are acquired during the lifetime of individuals; according to this theory, the only kind of variations that can be transmitted to progeny are those which are called congenital. For instance, there is no doubt that in his individual lifetime the arms of a blacksmith have their muscular power increased by constant exercise (or use) of the muscles in hammering; and therefore, if there were a thousand generations of blacksmiths, it seems reasonable to suppose that the children of the last of them would inherit somewhat stronger arms than those of average children — or *a fortiori*, than those of children born of a similarly long line, say, of watchmakers. This was the supposition that constituted the basis of Lamarck's theory of evolution, and, as we have seen, it was sanctioned by Darwin — although, of course, he differed from Lamarck in not regarding this supposed transmission of the effects of use and disuse as the sole factor of evolution, but merely as a factor greatly subordinate to that which he had himself discovered in survival of the fittest. Nevertheless, he unquestionably did regard this subordinate factor as one of high importance in co-operation with survival of the fittest, and, as Mr. Herbert Spencer has shown in detail, he apparently attributed more and more importance to it the longer that he considered its relation to the greater principle. But, as we have just seen, according to the school of Weismann it is only variations of a congenital kind that *can* be inherited; no matter what adaptive changes may be induced in the individual by suitable use and disuse of its several parts, and no matter what adaptive changes may be directly caused by environing agencies, these all count for nothing in the process of evolution; the only adaptive changes that can count for anything in this process are those which can be transmitted to progeny — *i.e.*, according to this school, those which arise fortuitously as congenital variations, for the accidental occurrence of which natural selection is always, so to speak, waiting and watching. The human hand, for example, considered as a mechanism, owes nothing to its continued use through numberless generations as an instrument for the performance of functions which it is now so admirably adapted to discharge; on the contrary, its evolution has throughout been exclusively dependent on the occurrence of fortuitous variations, which, whenever they happen to occur in a profitable direction, were preserved by natural selection, and passed on to the next generation. Now, it is evident that, according to this theory, natural selection is constituted the one and only cause of organic evolution; and for this reason the followers of Weismann are in the habit of calling his doctrine "pure Darwinism," inasmuch as, without invoking any aid from the Lamarckian principles above described, it constitutes the Darwinian principle of natural selection the sole, and not merely as he said the "main, means of modification."

Obviously, without going further than this quotation (which I have already made from the last edition of the "Origin of Species"), it is a misnomer to designate the doctrine in question "pure Darwinism." That quotation presents the only note of bitterness which is to be met with in the whole range of Mr. Darwin's writings, and it is a note which has express reference to this very point; notwithstanding the multifarious directions in which his doctrines were abused, the only protest against "steady misrepresentation" that he has ever allowed himself to lodge, he lodged against those who imputed to him this so-called doctrine of "pure Darwinism." On the other hand, it is no less manifest that this doctrine, although not pure Darwinism, assuredly is, and always has been, pure *Wallaceism.* In point of fact, it is with reference to this very doctrine of natural selection as the sole cause of organic evolution that the opinion of these two renovators of biology has been from the first divided; it is upon this point, and upon this point alone, that there has ever been any serious difference between them — for, as we shall presently find, every other point in which they failed to agree (save with respect to the origin of man) has a direct logical reference to this one, or grows out of this one by way of logical consequence.

And here we arrive at what seems to me the dramatic interest attaching to Mr. Wallace's latest work. On the present occasion I am not going to consider the pros and the cons of the momentous question which has always divided his teaching from that of his great compatriot. But, whether he is right or whether he is wrong, he has lived to see a most extraordinary revolution of biological thought in the direction of opinions which have always been distinctively his own, and which for a large part of a lifetime he has been virtually alone in maintaining.

Yet, notwithstanding the gratification with which Mr. Wallace must have watched this remarkable change within the last few years, there is in his recently published book no sound of exultation. On the contrary, his aim everywhere appears to be that of concealing his personal interest in this matter; and so well does he succeed that, after having finished his book, not one in a hundred of his readers will be in a position to surmise that for more than a quarter of a century their author has steadily maintained the opinions which are now being adopted by an influential and rapidly increasing body of evolutionists. Therefore, it is partly for the sake of drawing attention to a claim which Mr. Wallace characteristically abstains from making on his own behalf that I have ventured to write this review of his latest work. If ever there was an occasion when a man of science might have felt himself justified in expressing a personal gratification at the turning of a tide of scientific opinion, assuredly such an occasion is the present; and in whichever direction the truth may eventually be found to lie, historians of science should not omit to notice that in the very hour when his lifelong belief is gaining so large a measure of support Mr. Wallace quietly accepts the fact without one word of triumph.

To me individually it does not appear that the recent movement of scientific opinion in the direction of Wallaceism is scientifically justifiable; and therefore I remain an adherent of Darwinism, as this was left by the matured judgment of Darwin. For, on the one hand, I cannot find that the school of Weismann has added anything of importance to the body of facts previously known; while, on the other hand, I do find that Professor Weismann himself is put to the sorest straits while trying to maintain his theory in the presence of some of these facts. So that, while fully recognizing the extraordinary ability with which he has marshalled his evidence — and also, it may be added, the great service which he has rendered to biological science in raising certain questions of the highest possible importance in the acutest possible form — I must still confess that to my mind there does not seem to have been hitherto shown any adequate reason to pass from the theory of evolution as this was always held by Darwin, to the theory of evolution as it has always been held by Wallace. Therefore I am free to conclude this article by briefly considering the points upon which Wallace, in his matured publication on Darwinism, expressly differs from the teachings of Darwin.

As already stated, all these points of difference (with the one exception as to the origin of man) arise by way of logical necessity from the great or radical difference which we have hitherto been considering — viz., as to whether natural selection is only the "main" or actually "the exclusive means of modification." Nevertheless, it is desirable to consider what Mr. Wallace has to say upon these secondary or sequent points of difference, because, by examining them in the light of the diverse facts which they severally involve, we may obtain valuable material for guiding our judgment upon the larger issue.

SEXUAL SELECTION.

AGAINST Mr. Darwin's theory of sexual selection — *i.e.*, selection which depends on the superior power which males may be supposed to present in the way of charming their females — Mr. Wallace urges the following objections, which, in his opinion, are sufficient to dispose of the theory *in toto*.

In the first place, he argues that the principal cause of the greater brilliancy of male animals in general, and of male birds in particular, is that they do not so much stand in need of protection arising from concealment as is the case with their respective females. Consequently natural selection is not so active in repressing brilliancy of color in the males, or which amounts to the same thing, is more active in "repressing in the female those bright colors which are normally produced in both sexes by general laws."

Next he argues that not only does natural selection thus exercise a negative influence in passively permitting more heightened color to appear in the males, but even exercises a positive influence in actively promoting its development in the males, while, at the same time, actively repressing its appearance in the females. For heightened color, he says, is correlated with health and vigor; and as there can be no doubt that healthy and vigorous birds best provide for their young, natural selection, by always placing its premium on health and vigor in the males, thus also incidentally promotes, through correlated growth, their superior coloration.

Again, with regard to the display which is practised by male birds, and which constitutes the strongest of all Mr. Darwin's arguments in favor of sexual selection, Mr. Wallace points out that there is no evidence at all of the females being in any way affected thereby. On the other hand, he argues that this display may be due merely to general excitement; and he lays stress upon the more special fact that movable feathers are habitually erected under the influence of anger and rivalry, in order to make the bird look more formidable in the eyes of his antagonists.

Furthermore, he adduces the consideration that, even if the females are in any way affected by color and its display on the part of the males, and if, therefore, sexual selection be conceded a true principle in theory, still we must remember that, as a matter of fact, it can only operate in so far as it is allowed to operate by natural selection. Now, according to Mr. Wallace, natural selection must wholly neutralize any such supposed influence of sexual selection. For, unless the survivors in the general struggle for existence happen to be those which are also the most highly ornamented, natural selection must neutralize and destroy any influence that may be exerted by female selection. But obviously the chances against the otherwise best fitted males happening to be likewise the most highly ornamented must be many to one, unless, as Wallace supposes, there is some correlation between embellishment and general perfection, in which case, as he points out, the theory of sexual selection lapses altogether, and becomes but a special case of natural selection.

Once more, Mr. Wallace argues that the evidence collected by Mr. Darwin himself proves that each bird finds a mate under any circumstances — a general fact which in itself must quite neutralize any effect of sexual selection of color or ornament, since the less highly colored birds would be at no disadvantage as regards the leaving of healthy progeny.

Lastly, he urges the high improbability that through thousands of generations all the females of any particular species — possibly spread over an enormous area — should uniformly and always have displayed exactly the same taste with respect to every detail of color to be presented by the males.

Now, without any question, we have here a most powerful array of objections against the theory of sexual selection. Each of them is ably developed by Mr. Wallace himself in his work on "Tropical Nature;" and although I have here space only to state them in the most abbreviated of possible forms, I think it will be apparent how formidable these objections appear. Unfortunately the work in which they are mainly presented was published several years after the second edition of the "Descent of Man," so that Mr. Darwin never had a suitable opportunity for replying. But if he had had such an opportunity, as far as I can judge it seems that his reply would have been more or less as follows.

In the first place, Mr. Wallace fails to distinguish between brilliancy and ornamentation — or between color as merely "heightened," and as distinctively decorative. Yet there is obviously the greatest possible difference between these two things. We may readily enough admit that a mere heightening of already existing coloration is likely enough — at all events in many cases — to accompany a general increase of vigor, and therefore that natural selection, by promoting the latter, may also incidentally promote the former, in cases where brilliancy is not a source of danger. But clearly this is a widely different thing from showing that not only *a general brilliancy of color*, but also *the particular disposition of colors* in the form of ornamental patterns, can thus be accounted for by natural selection. Indeed, it is expressly in order to account for the occurrence of such ornamental patterns that Mr. Darwin constructed his theory of sexual selection; and therefore, by thus virtually ignoring the only facts which that theory endeavors to explain, Mr. Wallace is not really criticising the theory at all. By representing that the theory has to do only with brilliancy of color, as distinguished from disposition of colors, he is going off upon a false issue which has never really been raised.* Look, for example, at a peacock's tail. No doubt it is sufficiently brilliant; but far more remarkable than its brilliancy is its elaborate pattern on the one hand, and its enormous size on the other. There is no conceivable reason why mere brilliancy of *color*, as an accidental concomitant of general vigor, should have run into so extraordinary, so elaborate, and so beautiful a pattern of *colors*. Moreover, this pattern is only unfolded when the tail is erected, and the tail is not erected in battle (as Mr. Wallace's theory of the erectile function in feathers would require), but in courtship; obviously, therefore, the design of the pattern, so to speak, is correlated with the act of courtship — it being only then, in fact, that the general design of the whole structure, as well as the more special design of the pattern, becomes revealed. Lastly, the fact of this whole structure being so large, entailing not only a great amount of physiological material in its production, but also of physiological energy in carrying about such a weight, as well as of increased danger from impeding locomotion and inviting capture — all this is obviously incompatible with the supposition of the peacock's tail having been produced by natural selection. And such a case does not stand alone. There are multitudes of other instances of ornamental structures imposing a drain upon the vital energies of their possessors, without conferring any compensating benefit from a utilitarian point of view. Now, in all these cases, without any exception, such structures are ornamental structures which present a plain and obvious reference to the relationship of the sexes. Therefore it becomes almost impossible to doubt — first, that they exist for the sake of ornament; and next, that the ornament exists on account of that relationship. If such structures were due merely to a superabundance of energy, as Mr. Wallace supposes, not only ought they to have been kept down by the economizing influence of natural selection; but we can see no reason, either why they should be so highly ornamental on the one hand, or so exclusively connected with the sexual relationship on the other.

For these reasons I think that Mr. Wallace's main objection falls to the ground. Passing on to his subsidiary objections, I do not see much weight in his merely negative difficulty as to there being an absence of evidence upon hen birds being charmed by the plumage or the voice of their consorts. For, on the one hand, it is not very safe to infer what sentiments may be in the mind of a hen; and, on the other hand, it is impossible to conceive what motive can be in the mind of a cock, other than that of making himself attractive, when he performs his various antics, displays his ornamental plumes, or sings his melodious songs. Considerations somewhat analogous apply to the difficulty of supposing so much similarity and constancy of taste on the part of female animals as Mr. Darwin's theory undoubtedly requires. Although we know very little about the psychology of the lower animals, we do observe in many cases that small details of mental organization are often wonderfully constant and uniform throughout all members of a species, even where it is impossible to suggest any utility as a cause.

Again, as regards the objection that each bird finds a mate under any circumstances, we have here an obvious begging of the whole question. That every feathered Jack should find a feathered Jill is perhaps what we might have antecedently expected; but when we meet with innumerable instances of ornamental plumes, melodious songs, and the rest, as so many witnesses to a process of sexual selection having always been in operation, it becomes irrational to exclude such evidence on account of our antecedent prepossessions.

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* The only remarks he has to offer on disposition as distinguished from brilliancy of colors are offered as an after-thought suggested to him by the late Mr. Alfred Tylor's book on "Coloration in Animals and Plants" (1886). In this paper Mr. Tylor sought to show "that diversified coloration follows the chief lines of structure, and changes at points, such as the joints, where function changes." Now, while agreeing with Mr. Wallace that this posthumous work is "most interesting and suggestive," I certainly cannot agree with him in regarding the material which it presents as in any degree subversive of the theory of sexual selection. Even if it be granted that Mr. Tylor has satisfactorily established his principles, these principles do not in any way apply to sexual coloration; they apply only to coloration as affected by physiological functions common to both sexes. Moreover, even these functions are of a kind which cannot be supposed to affect, in either sex, those details in the color of feathers, etc., which it is the object of Mr. Darwin's theory to explain.

There remains the objection that the principles of natural selection must necessarily swallow up those of sexual selection, as the fat kine swallowed up the lean in the dream of Pharaoh. And this consideration, I doubt not, lies at the root of all Mr. Wallace's opposition to the supplementary theory of sexual selection. He is self-consistent in refusing to entertain the evidence of sexual selection, on the ground of his antecedent persuasion that in the great drama of evolution there is no possible standing-ground for any other actor than that which appears in the person of natural selection. But here, again, we must refuse to allow any merely antecedent presumption to blind our eyes to the actual evidence of other agencies having co-operated with natural selection in producing the observed results. And, as regards the particular case now before us, I think I have shown, as far as space will permit, that in the phenomena of decorative coloring (as distinguished from merely brilliant coloring), of melodious song (as distinguished from merely tuneless cries), of enormous arborescent antlers (as distinguished from merely offensive weapons), and so forth — I say that in all these phenomena we have phenomena which cannot possibly be explained by the theory of natural selection; and, further, that if they are to be explained at all, this can only be done, so far as we can at present see, by Mr. Darwin's supplementary theory of sexual selection.

I have now briefly answered all Mr. Wallace's objections to this supplementary theory, and, as previously remarked, I feel pretty confident that, at all events in the main, the answer is such as Mr. Darwin would himself have supplied, had there been a third edition of his work upon the subject. At all events, be this as it may, we are happily in possession of unquestionable evidence that he believed all Mr. Wallace's objections to admit of fully satisfactory answers. For his very last words to science — read only a few hours before his death at a meeting of the Zoological Society — were: —

"I may perhaps be here permitted to say that, after having carefully weighed, to the best of my ability, the various arguments which have been advanced against the principle of sexual selection, I remain firmly convinced of its truth."

INHERITED EFFECTS OF USE, DISUSE, AND DIRECT ACTION OF ENVIRONMENT.

We have just seen that one of Mr. Wallace's strongest arguments against sexual selection consists in representing *a priori* that there *can* be no room for the operation of such a principle in the presence of natural selection; the greater principle must swallow up the less. This *a priori* argument he extends to all the other supplementary principles which have ever been suggested, and appears to regard it as "a short and easy method" with the Darwinists. He urges it with special vehemence against the so-called Lamarckian principles, and therefore it is suitable that under this head we should consider more carefully the value of such an argument.

In the present connection this argument is that, even admitting the abstract possibility of Lamarckian principles, in the presence of natural selection they could never have an opportunity of acting, inasmuch as the needful changes would be effected by a natural selection of fortuitous variations more rapidly than they could be by an inheritance of the effects of use and disuse, etc. Now this argument admits of two rejoinders. First, it is surely conceivable that in many cases where slight (because initial and afterwards finely graduated) improvements are concerned, such improvements need not have been, *in every stage of their progress*, matters of life and death to the organisms presenting them. Yet, unless at *every* stage of their progress they were matters of life and death, they could not have been produced by the unaided influence of natural selection. Now it is just in such cases that the supplementary or Lamarckian principles are supposed by Darwinists to come in; for to the operation of these principles it is not necessary that at each stage of the process every slight improvement should be a matter of life and death to the organisms presenting it. To me it appears that we have here a consideration of the highest importance. Nowadays no one disputes the supremacy of natural selection over all other principles of organic change hitherto suggested, or even, it may be predicted, suggestable. But this acceptance of natural selection as *supreme* by no means necessitates (as Mr. Wallace appears to imagine) acceptance of natural selection as *unique*. Nor is there any incompatibility between our acceptance of natural selection as supreme and a further acceptance of any other principles as subordinate or co-operative. What we all agree upon is, that no such other principles can act, save in so far as they are allowed to act by natural selection; but to maintain that there can be no room for the action of any other principle hitherto suggested, or in the future suggestable, appears to me extravagant. At all events, the burden of proof must lie with any one who affirms that no adaptive improvement — or, indeed, change of any kind — can ever take place unless every stage in the gradual process has been a matter of life and death to the organisms presenting it — a burden of proof which it is obviously impossible that any one can ever be in a position to discharge.

In view of this consideration it seems to me that Mr. Wallace's *a priori* objection to the abstract possibility of Lamarckian principles falls to the ground, although of course the question remains whether there is any sufficient evidence *a posteriori* of their operation in actual fact. And a virtual answer to this question appears to me to be involved in the second consideration, which, as above stated, remains to be adduced.

Long ago Mr. Herbert Spencer pointed to the facts of co-adaptation within the limits of the same organism as presenting the strongest possible evidence of Lamarckian principles working in association with Darwinian. Thus, taking one of Lamarck's own illustrations, Mr. Spencer showed that there must be thousands and thousands of changes — extending to all the organs and even to all the tissues of the animal — which in the course of numberless generations have conspired to convert an antelope into a giraffe. Now the point is that, throughout the entire history of these changes, their utility must have always been dependent on their association. It would be useless that an incipient giraffe should present a tapering down of the hind-quarters, unless at the same time it presented a tapering up of the fore-quarters; and as each of these modifications entails innumerable subordinate modifications throughout both halves of the creature concerned, the chances must be infinity to one against the required association of so many changes happening to arise by way of merely fortuitous variation. Yet, if we exclude the Lamarckian interpretation as adopted by Darwin, which gives us an intelligible *cause* of co-adaptation, we are required to suppose that such a happy concurrence of innumerable co-adaptations must have occurred by mere accident, and this thousands and thousands of times in the bodies of as many successive ancestors of the existing species; for, at each successive stage of the improvement, natural selection (if working alone) must have needed all, or at any rate most, of the co-adaptations to occur in the same individual organisms.

Against this formidable consideration Mr. Wallace adduces the following rejoinder: "The best answer to this objection may, perhaps, be found in the fact that the very thing said to be impossible by variation and natural selection has been again and again effected by variation and artificial selection." This analogy he then enforces by special illustrations, etc.; but does not appear to perceive that it really misses the whole point of the difficulty against which it is brought.

The point of the difficulty is, not that the needful variations do not occur, but that they occur associated in the same individual, and that unless they do thus occur associated in the same individual they must be useless — *i.e.*, cannot fall under the sway of natural selection. Therefore the analogy of artificial selection is here irrelevant, seeing that it fails in respect of the very point which it is adduced to meet. The difference between natural selection and artificial selection is, that while the former acts with exclusive reference to the utility (or life-preserving character) of variations, the latter acts without such reference. Hence, there is obviously no difficulty in understanding how artificial selection is able to choose this, that, and the other congenital variation as each happens to occur in so many different individuals, and, by suitable pairing, to blend them together in any required proportions. But artificial selection is able to do this simply because the selected individuals do not depend for their lives upon presenting the blended characters which it is the object of such selection to produce. Natural selection, on the other hand (if working alone), must wait until the blended characters happen to arise *fortuitously* in the same individuals — in all cases, that is, where utility depends on the co-adaptation of characters, which are the only cases now under consideration. Thus the two forms of selection present absolutely no point of analogy in the very respects where it is necessary that they should, if Mr. Wallace's appeal from one to the other is to be logically justified. In the one case the association of characters is purposely produced *by* the selection; in the other case it must arise by chance before its resulting utility can be offered *to* the selection.

NATURAL SELECTION AS A CAUSE OF STERILITY BETWEEN SPECIES.

AFTER matured deliberation Mr. Darwin came to the conclusion that natural selection could not be a cause of sterility between species. Mr. Wallace now furnishes an argument to show that in this respect also Mr. Darwin "underrated" the powers of natural selection. The argument, however, is too abstruse to admit of reproduction here. On the present occasion, therefore, I will merely remark that it does not seem so much as to try to meet the considerations which determined Mr. Darwin's judgment in the opposite direction. Nevertheless the theory is profound as well as ingenious, and, although it fails to convince me, I am glad to note that in the course of its exposition Mr. Wallace appears to sanction the essential principle of my own hypothesis of "physiological selection" — viz., to quote his own words, "it is by no means necessary that all varieties should exhibit incipient infertility, but only some varieties; for we know that of the innumerable varieties that occur but few become developed into distinct species, *and it may be that the absence of infertility, to obviate the effects of intercrossing, is one of the usual causes of their failure.*" The words which I have italicized very tersely convey the whole gist of "physiological selection."

Later on, however, he criticises adversely what I have written upon this subject, and also represents me as having misunderstood Mr. Darwin's views with respect to the utility and inutility of specific characters. On both these points I shall have an answer to make on some future and more suitable occasion. In this article I have confined attention to points wherein Mr. Wallace differs from Mr. Darwin; and although in so doing it has been necessary for me to express uniform disagreement with the author of "Darwinism," this has been due only to the limitations of my project, and in no way prevents my cordial appreciation of his work as a whole. Indeed, with the exception of those differences from Mr. Darwin, which it has been my object on the present occasion to consider, it appears to me that Mr. Wallace's latest work is one of the most interesting and suggestive in the whole range of Darwinian literature. And even these points of difference, it will be remembered, all arise out of the single difference before stated — namely, whether natural selection is to be regarded as the main, or as the exclusive, means of modification. Therefore, notwithstanding all that I have said on the Darwinian side of this momentous question, the fact that it still remains an open question compels us to recognize that Mr. Wallace's views with regard to it may eventually prove to be right; while, in any case, he is certainly to be congratulated on having lived to see the great movement which has recently taken place in the direction of those views. But to many of us it still appears that Mr. Darwin's judgment on this matter is the sounder one to follow. When a great generalization has been fairly established, there is always a tendency to exaggerate its scope; and, perhaps, in no respect was the wonderful balance of Mr. Darwin's mind so well displayed as it was in the caution with which he abstained from assigning to his vast principle of natural selection a sole prerogative. Moreover, as previously stated, the longer that he pondered the question, the more he became persuaded that the problem of organic evolution as a whole was too complex and many-sided to admit of being resolved by the application of a single principle. This conclusion, I believe, will eventually be justified by the advance of biological science; and, therefore, until some better reason is shown than has yet been shown for departing from it, I cannot help feeling that naturalists will do well to suspend their judgments, even if they are not so sure as they used to be touching the doctrines of Darwinism, as these were left by Darwin.

From The Cornhill Magazine.

PATIENCE.

CHAPTER I.

SHE was the plainest — one might almost say ugliest — of the entire cargo; and there were seventeen of them. Poor Patience Owen! The cargo consisted of real live English women, sent out to become the wives of the bachelor missionaries of Shikarore. The Trincomalee had brought them out from Liverpool, and they were now coming into harbor at Khansal, chaperoned by the wife of a leading minister who was coming to rejoin her husband, and all agog to espy the first aspirants to their hands. The principle upon which the brotherhood acted on these occasions was that of "first come first served," and, lest some ill-favored maiden should be palmed off upon them through the carelessness of a proxy, a good number of the missionaries had managed to get away from the scene of their labors so as personally to select upon their arrival at Khansal the future partners of their joys and sorrows. If once a young woman had been told off to an absentee, and a suitable escort found for her to the gentleman's neighborhood, objections were useless, and the very next day she would be married to him from her escort's house.

Speculations, conjectures, even dreams, had formed the staple of the young ladies' conversation on the voyage out; needless to say whither they tended. Were not the seventeen coming out *to be married?* What harm then to give the reins to imagination and tongue on the subject of their *futurs?* The prettiest aimed high, for of course on so sketchy an acquaintance the charms of the outer woman would principally attract the suitors, and the most engaging in appearance would be the first chosen; though indeed the passing triumph thus obtained might well be neutralized by the possible undesirability of the "first come." If a hard-featured and elderly person be ever so capable a housewife, and a noted teacher of Sunday schools be afflicted with a cast in her eye and a bad complexion, men (and missionaries are also men) will fail in properly appreciating their good qualities; weakly preferring some better-favored sister, ignorant, perchance, of the best recipe for strawberry jam — not after all of overwhelming importance in the East — or the names of the kings of Israel and Judah. But Patience! She was small, and a little bit lame. Her poor little face had a pinched and half-starved look; her little grey linen dress was skimpily made; her hair was turning grey although she was only twenty-five; and, from having always been the butt and fetish of her own family, she had grown stupidly awkward, apt to blush and to knock things over in her nervousness, afraid to say what came into her head lest she should be laughed at, and therefore remaining silent, shy, and apparently dull. *She* was far too much afraid of the children to be an efficient Sunday-school teacher, and her mother was a notable housekeeper who had tolerated not so much as an offer of help from clumsy Patience. But she could sew neatly, and would no doubt darn her husband's socks to perfection; her voice had a pleasant tone whenever she dared to use it; and she was the most unselfish creature upon earth, with a heart like an artichoke and the courage of a mouse. She had been shipped off to the East because she was no longer welcome at home. Her mother was dead, and her brother, now the head of the family, and his young wife despised her, and looked upon her as an encumbrance. She was not very strong-minded; and when the minister under whom they sat suggested a means of providing for poor little Patience, her relations showed such eagerness to seize the opportunity that it was impossible to withstand them, even had she had any reasonable objection to offer, which she had not. So here she was, standing, one of seventeen, on the deck of the Trincomalee.

"Cheer up, my dear," said her neighbor, a buxom damsel, unafflicted with nerves and notions. "One good thing, there'll be no mothers-in-law, at least none to speak of. For my own part I would not object to marrying a foundling; I don't hold with taking on a pack of your husband's relations for your own."

"Ah," sighed Patience, "perhaps you're right. It isn't always too easy to live at peace with one's own family, let alone some one else's."

"True, my dear, for such as you who couldn't hold your own with a daddy-long-legs. But we aren't all made alike, thank God."

With which pharisaical observation she turned away, leaving poor Patience to reflect upon her shortcomings. These reflections had not materially improved her case before the ship came to an anchor, and her thoughts were diverted, not too agreeably, from their channel by the sight of swarms of scantily clad natives jabbering and scuffling in the shore-boats alongside. None of the candidates had come out to the steamer, but awaited the arrival of its fair freight at the shipping office. Thither the gallant seventeen were duly conveyed under Mrs. Abbott's maternal eye; and indeed no better guardian could have been chosen than this shrewd but kind-hearted woman, whose task had been no sinecure since she left Liverpool a month before. Each gentleman in the order of his arrival at the office had been presented with a numbered ticket, No. 1 having been secured by a small, pale, patient missionary, whose first wife had been similarly purveyed, and who knew exactly how to proceed on this, the second "auspicious occasion." He sat quietly on a packing-case, with his ticket tightly

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John Fiske
on the
Triumph
of
Darwinism
1877.

expressed should avoid them. But Mr. Harte's thoughts are so good, the images in his mind are so original, that his works are certain to fascinate the reader in spite of the slovenly mannerism of his writing. One of the bad results of an inferior style and of a want of proper reticence in a writer is that the reader who has read but a little of him is likely to conceive a mean opinion of him. It is necessary to read a great deal of Mr. Harte to have a right opinion of his works. They form together a picture of the life, landscape, and society which the author saw in his youth; the picture lies in the author's mind as a whole, and should so lie in the reader's mind; a thought or image of Mr. Harte's which, taken by itself, might appear to be of no great significance, will become much more interesting when it is seen as part of this picture.

E. S. NADAL.

ART. IV.—THE TRIUMPH OF DARWINISM.

IT is not often that the propounder of a new and startling scientific theory has lived to see his daring innovations accepted by the scientific world in general. Harvey's great discovery of the circulation of the blood was scoffed at for nearly a whole generation; and Newton's law of gravitation, though proved by the strictest mathematical proof, received from many eminent men but a slow and grudging acquiescence. Even Leibnitz, who as a mathematician hardly inferior to Newton himself might have been expected to be convinced on simple inspection of the theory, was prevented from accepting it by the theological objection that it appeared to substitute the action of a physical force for the direct action of the Deity. In France, where ideas not of French origin are very apt to be but slowly apprehended, the opposition to the Newtonian theory was not silenced till 1759, when Clairaut and Lalande, by calculating the retardation of Halley's comet, furnished such crucial proof as could not possibly be overcome. At this time Newton had been thirty-two years in his grave; seventy-two years had elapsed since the publication of the "Principia," and ninety-four since the hypothesis was first definitely conceived.

things were in the play which Mr. Boucicault would have left out. It is one of Mr. Boucicault's principles, I am told, that an audience should not be surprised, and he refrains from doing this for the very good reason that they do not like to be surprised. The coming point must not be made too plain, but the audience must be prepared for it and permitted to suspect it. When a surprise is sprung upon them, they think the new point arbitrary and unnatural. In "Two Men of Sandy Bar" the audience were at no time able to judge what was coming; they were often surprised, and always bewildered; there was no story, or one which it would have been as hard as a sum in algebra to get straight; the aim appeared to be to get in everything, and to contrive a plot which would be a thin and intricate theory of the conduct of the characters. The play, of course, made no pretensions to be a literary effort; I only speak of it here because it showed the same want either of judgment or of industry which is shown in "Gabriel Conroy," the same confusion and helplessness when the author sits down before a long story and a great many facts.

The style of Mr. Harte is very incorrect and imperfect. This is a much graver fault than the want of ability to sustain a character through a prolonged description. Mr. Harte is not under the least obligation to write long stories; but he cannot write at all without using words. Why should he choose to express himself in the shabby style of the newspapers? He has not a proper sense that his fine thoughts deserve to be expressed with perfection. It would seem to be only necessary to perfectly conceive a thought to be able to express it well; the thought should be the thread by which one should be able to find his way out of the labyrinth of a bad style. Why should Mr. Harte use such a phrase as "moral atmosphere" to denote a thought which could be so much more elegantly expressed by plain words? No kind of phrase is so poor and feeble as an exploded figure of speech; unless a figure can be used which will express the thought with novel truth, the thought should be expressed in plain words. Those figures of speech which people have forgotten are usually inelegant, and often indicate that the writer does not know quite what he would say. A newspaper writer in haste for a phrase may seize one of them gratefully; but one who is writing a page containing a conception which he thinks worthy to be perfectly

In the present age, when the number of scientific inquirers has greatly increased and the interchange of thoughts has become rapid and constant, it takes much less time for a new generalization to make its way into people's minds. It is now barely eighteen years since Mr. Darwin's views on the origin of species were announced in a book which purported to be only the rough preliminary sketch of a greater work in course of preparation. But, though greeted at the beginning with ridicule and opprobrium, the theory of natural selection has already won a complete and overwhelming victory. One could count on one's fingers the number of eminent naturalists who still decline to adopt it, and the hesitancy of these appears to be determined in the main by theological or metaphysical, and therefore not strictly relevant, objections. But it is not simply that the great body of naturalists have accepted the Darwinian theory: it has become part and parcel of their daily thoughts, an element in every investigation which cannot be got rid of. With a tacit consent that is almost unanimous, the classificatory relations among plants and animals have come to be recognized as representing degrees of genetic kinship. One needs but to read constantly such scientific journals as "Nature," or to peer into the proceedings of scientific societies, to see how thoroughly all contemporary inquiry is permeated by the conception of natural selection. The record of research, whether in embryology, in palæontology, or in the study of the classification and distribution of organized beings, has come to be the registration of testimony in support of Mr. Darwin's hypothesis. So deeply, indeed, has this mighty thinker impressed his thoughts on the mind of the age that in order fully to unfold the connotations of the word "Darwinism" one could hardly stop short of making an index to the entire recent literature of the organic sciences. The sway of natural selection in biology is hardly less complete than that of gravitation in astronomy; and thus it is probably true that no other scientific discoverer has within his own lifetime obtained so magnificent a triumph as Mr. Darwin.

The comparison of the doctrine of natural selection with the Newtonian theory is made advisedly, as I wish to call attention to some differences in the aspect of the proofs by which two such different hypotheses are established. First, however, as the point will not hereafter come up for consideration in this paper, it may be well to notice the theological objection which has been urged against Mr. Darwin, as it was once urged against Newton, and to show briefly why, as above hinted, it cannot be regarded as properly relevant to the discussion of the scientific hypothesis. The theological objection to natural selection, which has weight with many minds, is precisely the same objection that Leibnitz made to gravitation, — that the action of physical forces appears to be substituted for the direct action of the Deity. This has, indeed, been a very common objection to theories which enlarge and define what is called the action of secondary causes, but it has been peculiarly unfortunate in this respect, that with the progress of inquiry it has invariably been overruled without practical detriment to theism. It regularly happens that the so-called atheistical theory becomes accepted as part and parcel of science, and yet men remain as firm theists as ever. The objection is, therefore, evidently fallacious, and the fallacy is not difficult to point out. It lies in a metaphysical misconception of the words "force" and "cause." "Force" is implicitly regarded as a sort of entity or dæmon which has a mode of action distinguishable from that of universal Deity; otherwise it is meaningless to speak of substituting the one kind of action for the other. But such a personification of "force" is a remnant of barbaric thought, and is in no wise sanctioned by physical science. When astronomy speaks of two planets as attracting each other with a "force" which varies directly as their masses and inversely as the squares of their distances apart, it simply uses the phrase as a convenient metaphor by which to describe the manner in which the observed movements of the two bodies occur. It explains that in presence of each other the two bodies are observed to change their positions in a certain specified way, and this is all that it means. This is all that a strictly scientific hypothesis can possibly allege, and this is all that observation can possibly prove. Whatever goes beyond this and imagines or asserts a kind of "pull" between the two bodies, is not science but metaphysics. An atheistic metaphysics may imagine such a "pull," and may interpret it as the "action" of something that is not Deity, but such a conclusion can find no support in the scientific theorem, which is simply a generalized description of phenomena. The general considerations upon which the belief in the existence and direct action of Deity are otherwise founded, are in no wise disturbed by the establishment of any such scientific theorem. The theological question is left just where it was before. We are still at perfect liberty to maintain that it is the direct action of Deity which is manifested in the planetary movements; having done nothing more with our Newtonian hypothesis than to construct a happy formula for expressing the mode or order of the manifestation. We may have learned something new concerning the manner of Divine action; we certainly have not "substituted" any other kind of action for it. And what is thus obvious in this simple astronomical example is equally true in principle in every case whatever in which one set of phenomena is interpreted by comparison with another set. In no case whatever can science use the words "force" or "cause" except as metaphorically descriptive of some observed or observable sequence of phenomena. And consequently at no imaginable future time, so long as the essential conditions of human thinking are maintained, can science even attempt to substitute the action of any other power for the direct action of Deity. Darwinism may convince us that the existence of highly complicated organisms is the result of an infinitely diversified aggregate of circumstances so minute as severally to seem trivial or accidental; yet the consistent theist will always occupy an impregnable position in maintaining that the entire series in each and every one of its incidents is an immediate manifestation of the creative action of God.

From an obverse point of view it might be argued that since a philosophical theism must regard Divine power as the immediate source of all phenomena alike, therefore science cannot properly explain any particular group of phenomena by a direct reference to the action of Deity. Such a reference is not an explanation, since it adds nothing to our previous knowledge either of the phenomena or of the manner of Divine action. The business of science is simply to ascertain in what manner phenomena coexist with each other or follow each other, and the only kind of explanation with which it can properly deal is that which refers one set of phenomena to another set. In pursuing this its legitimate business science does not trench on the province of theology in any way, and there is no conceivable occasion for any conflict between the two. From this and the previous considerations taken together it follows not only that such explanations as are contained in the Newtonian and Darwinian theories are entirely consistent with theism, but also that they are the only kind of explanations with which science can properly concern itself at all. To say that complex organisms were directly created by the Deity is to make an assertion which, however true in a theistic sense, is utterly barren. It is of no profit to theism, which must be taken for granted before the assertion can be made; and it is of no profit to science, which must still ask its question, "How?"

Setting aside, then, the theological criticism as irrelevant to the question really at stake, the Darwinian theory, like the Newtonian, remains to be tested by strictly scientific considerations. In the more recent instance, as in the earlier, the relevant question is how far the course of events as sketched by the hypothesis agrees with the observed phenomena of nature. But in the directness with which this question can be answered there is great difference between the two theories. The Newtonian hypothesis asserted the existence of a general physical property of matter, and could therefore be tested by a single crucial instance, such as was afforded by the simple case of the planetary motions. Kepler's three laws comprised in succinct form a very complete description of the movements of the planets, and when it was shown that these movements were just such as must occur according to the theory of gravitation, the theory was rightly regarded as verified. Further confirmatory instances could but repeat the same lesson, as when the irregularities of movement, due to the attractions exercised by the various planets upon each other, were likewise seen to conform strictly to the hypothesis. Nor was any alteration or enlargement of the original theory required in order to obtain the supreme triumph of verified prediction, as when Clairaut foretold the precise amount of delay in the reappearance of Halley's comet caused by the interfering attractions of Jupiter and Saturn, or as when Leverrier and Adams discovered the existence of Neptune through its effects upon the motions of Uranus. In all these cases the physical principle involved was simple, and admitted of precise mathematical treatment; and it is owing to this that the law of gravitation has become the most illustrious example which the history of science can furnish of a completely verified hypothesis.

To look for similar conciseness of verification in the case of the Darwinian theory would be to mistake entirely the conditions under which scientific evidence can be procured. To estimate properly the value of any hypothesis it is necessary that we should know what kind and degree of proof to expect; and in the present case we must not look for a demonstration that shall be direct and simple. Instead of a universal property of matter, so conspicuous as to be recognized at once by the inspection of a few striking instances, we have in the theory of natural selection to deal with a very complex process working results of endless diversity throughout the organic world, and often masked in its action by accompanying processes, some of which we can detect without being able to estimate their relative potency, while others no doubt have thus far escaped our attention altogether. Accordingly, while we may consider it as certain that natural selection is capable of working specific changes in organisms, we may at the same time find it impossible to give a complete account of the origin of any one particular species through natural selection, because we can never be sure that we have taken due notice of all the innumerable concrete circumstances involved in such an event. The theory, therefore, cannot be adequately tested by any single striking instance, but must depend for its support on the cumulative evidence afforded by its general harmony with the processes of organic nature.

If we consider the Darwinian theory as a whole, it must be admitted that such cumulative evidence has already been brought forward in sufficient quantity to amount to a satisfactory demonstration. The convergence of proofs is too persistent and unmistakable to allow of any alternative hypothesis being put in the field. But in exhibiting this, it is desirable that there should be no confusion of thought as to the full import of the Darwinian theory. Mr. Mivart's way of describing that theory as an attempt to account for the origin of all the various forms of life through the operation of natural selection alone, is a gross misrepresentation. Mr. Darwin has never urged his hypothesis in this limited shape. The essential theorems of Darwinism are, *first*, that forms of life now widely unlike have been produced from a common original through the accumulated inheritance of minute individual modifications; and, *secondly*, that such modifications have been accumulated mainly, or in great part, through the selection of individuals best fitted to survive and transmit their peculiarities to their offspring. But that this survival of the fittest individuals has been the sole agency concerned in bringing about the present wondrous variety of living beings, Mr. Darwin has nowhere asserted or implied, having even in the earliest edition of his great work explicitly pointed out certain other agencies as involved in the complex result. Yet other agencies, hitherto unsuspected, may be discovered in the future; but such discoveries, however far they may go in supplementing the Darwinian theory, can only strengthen its central position as regards the rise of specific differences through gradual modifications.

That natural selection is a true cause, and one capable of accumulating variations to an indefinite extent, is now held to be beyond question. The wonders wrought by artificial selection in the breeding of domestic animals and cultivated plants are such that one might well have attributed great results to the exercise of a similar selection by Nature through countless ages, could any such process be detected. Few, however, save those instructed naturalists who have frequent occasion to ponder the subject, are aware what a tremendous reality natural selection is. As I have elsewhere observed, "a single codfish has been known to lay six million eggs within a year. If these eggs were all to become adult codfishes, and the multiplication were to continue at this rate for three or four years, the ocean would not afford room for the species. Yet we have no reason to suppose that the race of codfishes is actually increasing in numbers to any notable extent. With the codfish, as with animal species in general, the numbers during many successive generations oscillate about a point which is fixed, or moves but slowly forward or backward. Instead of a geometrical increase with a ratio of six millions, there is practically no marked increase at all. Now this implies that out of the six million embryo codfish a sufficient number will survive to replace their two parents, and to replace a certain small proportion of those contemporary codfishes who leave no progeny. Perhaps a dozen may suffice for this, perhaps a hundred. The rest of the six million must die." * The amount of destruction is not so great as

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* Outlines of Cosmic Philosophy, Vol. II. p. 12.

this in all parts of the animal kingdom. Among the higher birds and mammals the preservation of the individual bears a very much higher ratio to the preservation of the race. But with the immense classes of fishes, insects, and crustaceans, as well as the sub-kingdom of molluscs, — which taken together make up by far the greater portion of the animal world, — the destruction continually going on is probably not less than that which is described in the example cited. Even if we were to take account only of the individuals which survive the embryo or larva state, but do not succeed in leaving offspring behind them, the cases of destruction would still bear an enormous ratio to the cases of preservation. But in maintaining the characteristics of a race only those individuals can be counted who produce offspring. It is obvious then that each species of organisms, as we know it, consists only of a few favored individuals selected out of countless multitudes who have been tried and rejected as unworthy to live. No selection that is exercised by man compares in rigor with this. It is somewhat as if a breeder of race-horses were to choose, with infallible accuracy of judgment, the two or three fleetest out of each hundred thousand, destroying all the rest that the high standard of the breed might run no possible risk of deterioration. In such a rigorous competition as this, no individual peculiarity can be so slight that we are entitled to regard it as unimportant. No peculiarity is really slight that enables its possessor to survive until he transmits it to posterity.

In view of all this we see how misleading it is to describe natural selection (as Mr. Mivart does) as a process which operates only occasionally upon variations assumed to be fortuitous. We see that natural selection, like a power that slumbers not nor sleeps, is ever preserving the stability of species by seizing all individual peculiarities that oscillate within narrow limits on either side of the mean that is most advantageous to the species, while cutting off all such peculiarities as transgress these limits. Domesticated animals, protected from the exigencies of wild life, often exhibit great varieties in coloring, while wild animals of the same genus or species are monotonously colored, because only one kind of coloring will aid them in catching prey or eluding enemies, and all the variations are killed out. Who can doubt that antelopes are so fleet, only because all but the fleetest individuals are sure to be overtaken and eaten by lions? Protected from the lions, a thousand generations might well make them as lazy and clumsy as sheep.

Operating in this stern way, natural selection secures the general adaptation of each race of organisms to the conditions of life which surround it. And so long as a species continues surrounded by circumstances that are tolerably persistent, natural selection maintains its stability of character. Thus what the older naturalists called the "fixity of species" is fully accounted for. But a "fixity of species" that is maintained only under such conditions is really no fixity at all. Change the surrounding circumstances and the average character of the species must change. Slight peculiarities that once insured survival will now insure destruction, and tendencies to vary that once would have been nipped short will now be encouraged and exaggerated. In this way the strong tendency, hereditary in all mammals, toward the growth of hair on the surface was greatly exaggerated in the Siberian mammoth, while checked in his brethren, the elephants of India and Africa. In this way a peculiar curve in the contour of butterflies' wings, which is persistently killed out in India and Java, is with equal persistency selected for preservation in Celebes. How far such alterations in the direction of natural selection may work deep-seated changes in the structure of an organism, one cannot accurately define; but there is no doubt that they go very far indeed, when taken in connection with the facts of what is called "correlation of growth." An organism is not a mere aggregation of parts, of which one can be altered without affecting the others. Increase in the size and weight of a deer's horns entails an increase in the size of the cervical vertebræ and muscles, and indirectly modifies the shoulders and fore-limbs; while all these changes, by altering the animal's centre of gravity, cause compensating changes in the rest of the body. Increased thickness of fur modifies the efficiency of the skin as an excreting organ, and thus reacts upon the lungs, liver, and kidneys. But it is not only in these clearly traceable ways that correlation of growth is manifested. Sometimes the correlations are inexplicable. Thus, to lengthen the beak of a pigeon is to increase the size of his feet, hairless dogs have their teeth imperfect, and white tomcats with blue eyes are almost invariably deaf. In the present state of physiological knowledge we cannot account for such facts; but it is enough for the purposes of the Darwinian theory to know that they exist. For, taken all together, they show that natural selection, operating on even the most superficial variations, is quite competent to work deep-seated changes of structure and function.

When we consider, then, that the circumstances which determine what individuals shall survive are not constant in the long run for any species, though apparently constant for limited periods of time; when we reflect that there is no one of the larger groups of plants and animals — such as orders, or families, or even genera — which has not been subjected again and again to great and complicated changes of environment, it becomes evident that anything like "fixity of species" is utterly out of the question. No such thing is possible or even imaginable, when once the facts of the case have been thoroughly conceived. Looking over the earth's surface to-day, things may seem quiet and stable enough. But if we contemplate the succession of past events, as disclosed by the geologist, what mainly strikes our attention is the secular turmoil. Islands aggregating into continents; continents breaking up into archipelagoes; rivers shifting their beds; coast-lines changing their direction; oceans now separated by impassable isthmus-walls, now mingling their floras and faunas through new-made channels; torrid zones becoming temperate, and temperate zones growing frigid; marshes transformed into deserts, and glaciated valleys thawing into sunny lakes; high table-lands sinking into ocean-floors, and submarine ledges rearing their heads as Alpine ranges; deep-sea molluscs and crustaceans seeking refuge in shallow waters, while littoral organisms migrate upland to find new food and contend with new enemies; plant-seeds carried by vagrant birds to unwonted habitats; peaceful tribes of ruminants decimated by invading carnivores; ceaseless conflict, and redistribution of every possible sort, — these are the things we are called upon to contemplate. Remembering, then, how stability of species is maintained only by the rigorous selection of a few individuals that are best adapted to a given set of exigencies, we see that, as the combinations of exigencies are altered from time to time, the stability of species can in general be but temporary. Now and then we may expect to find very long persistency of type where, in spite of great terrestrial changes, some simple set of conditions most important to the organism remains unaltered; but in the vast majority of cases such persistence is impossible. It is seldom that the life of any species extends over more than one geological epoch; often the duration is much shorter than this.

Whether, therefore, it is practicable for us to-day to explain every minute peculiarity of any one particular species by an appeal to natural selection alone, is not the main point to be considered in estimating the success of the Darwinian theory. The question has a scientific interest of its own which is very great, but it is not the main question. The main point is that, admitting natural selection to be a *vera causa* at all (and this no one denies), the stability of species is proved to be but a contingent and temporary affair. The old notion of an absolute fixity of species is overthrown once for all, and with it the only semblance of an argument that could ever have been alleged in behalf of the hypothesis of special creations. For in considering nearly allied forms, like the lion, tiger, and leopard, their actual consanguinity would never have been doubted for a moment but for the inability of naturalists to understand how the type which appears so constant, when viewed through a short period of time and amid unchanging conditions, should after all be variable. Unable to imagine any probable cause or method of variation by which the descendants of a common feline ancestor should have acquired the divergent characters of lions and leopards, the naturalist either gave up the problem as insoluble, or else retreated upon the assumption that leopards and lions were separately created. In either case science was equally at fault, for, as above argued, the hypothesis of special creations, as referring a particular group of phenomena to that Divine action which is the equal source of all phenomena, is not entitled to be considered a scientific explanation. But when Mr. Darwin called attention to the working of natural selection, the difficulty was removed, and it at once became highly probable that such allied forms had diverged from a common stock through the accumulation of minute modifications.

Such being the conclusion to which we are led by considering the process of natural selection, it becomes desirable to inquire whether the conclusion is confirmed by the most general phenomena of organic life that have been observed and tabulated. There is no hesitation or ambiguity in the answer. Whether we consider the classificatory relationships of plants and animals, their embryology, their morphology, their geographical distribution, or their geological succession, there is not only abundance of evidence, but the evidence points wholly in one direction. With entire unanimity the phenomena in question testify that species have arisen by descent with modifications and not by disconnected acts of creation. The facts of classification alone are sufficiently decisive. By the older naturalists who sought to arrange animals and plants in groups according to their resemblances, attempts were often made to construct a linear series in which each group should be intermediate between those which preceded and those which followed it. All such attempts proved futile, and after a half-century of discussion and criticism it became evident that the only possible classification which correctly represents the facts is one in which organisms are arranged in divergent groups and sub-groups, like the branches and twigs of what is aptly termed a family tree. Wherever different orders, families, or genera show points of resemblance to each other, the resemblances occur always at the bottom, among their least highly developed species. Apes, bats, and rabbits are sufficiently distinct in type, but the lowest members of the orders to which these animals respectively belong are strikingly like one another. At the bottom of the mammalian class, the echidna and duck-bill have many points in common with birds and reptiles; while birds and reptiles not only draw together so that it is hard to distinguish their most primitive forms as clearly bird or clearly reptile, but these primitive forms remind one in many ways of the batrachians. A batrachian, in turn, is an animal which ends its life as a kind of reptile after having begun it as a kind of imperfectly specialized fish. Again, the lowest known vertebrate, the amphioxus, — usually ranked with fishes, though hardly specialized enough to be called a true fish, — exhibits marks of actual relationship with the ascidian, which is nothing more than a worm of the order known as tunicata. No two animals could be less like each other than a bee and a nautilus, yet in their lowest members the two sub-kingdoms of articulata and molluscs become barely distinguishable from each other and from the worms with which the vertebrate sub-kingdom also becomes blended. It is on account of this convergence of types as we descend in the scale that naturalists have found it so difficult to classify satisfactorily those lower organisms which Cuvier roughly grouped together as radiata. Parallel phenomena recur as we reach the confines of the animal and vegetal kingdoms and meet with numbers of organisms which there is as much reason for assigning to the one kingdom as to the other. All this complicated arrangement of organisms in groups within groups, resembling each other at the bottom of the scale and differing most widely at the top, is just what is presupposed by the Darwinian theory of "descent with modifications," and on any other theory it appears to be totally inexplicable.

Precisely similar testimony as to gradual divergence is found in the facts of embryology and morphology. It is a familiar fact that the germs of all organisms are like each other, and are, moreover, very like such lowest forms of life as the amœba and protococcus. But as a germ develops it becomes specialized and defined, first as to its sub-kingdom, then as to its class, order, family, genus, species, and variety. The germ-cell of a mandril is at first indistinguishable from that of a snail or lobster. The fœtal ape arising therefrom is at first definable as a vertebrate, but not as a mammal; on the other hand, it circulates its blood through a system of gills, and its nascent heart is like the heart of a fish. Presently, with the appearance of the allantoidal membrane, the fœtus seems to be on the point of becoming a reptile or bird; but after a while it declares itself a mammal. Next it becomes apparent that it is not a rodent or insectivore, but a primate; next, it exhibits characteristics which define it as a true ape, and not a lemur; still later, it is seen to be a catarrhine ape; and finally, it is born with the specific attributes of a mandril, which are, however, further intensified as it reaches maturity. Facts like these, which are invariably found in the embryonic development of organisms, tell just the same story as the facts of classification. If they do not mean that the various forms of organic life have arisen by gradual divergence from a common original, one might well be excused for doubting whether the phenomena of nature have any rational meaning whatever. Of like import are many of the more special facts of embryology, such as the useless rudiments of hind limbs in many snakes, the presence of teeth in the beaks of sundry embryonic birds and in the jaws of fœtal whales, and the gill-like glands in the human throat. And as if all this were not enough, the study of morphology discloses that all the diversified mechanical functions performed by the various animals comprised in any sub-kingdom are achieved by more or less considerable modifications of a framework that in its typical features is common to all. In embryonic development the fins of the fish correspond with the legs of reptiles and mammals, and with the legs and wings of birds. To enable the bat to fly, no new mechanism is invented, but an embryonal hand develops into a wing by the elongation of its fingers and the growth of the web-like skin between them.

If we consider the most general features of the geographical distribution and geological succession of organisms, we find the evidence hardly less complete and convincing. Generally speaking, the contemporary species found in any geographical area most closely resemble the species that inhabited the same area in former ages. Thus in the Miocene age Australia abounded in marsupials, and marsupials specifically different, though nearly allied to these, make up to-day the greater part of the mammalian fauna of Australia. There is no imaginable reason why this should be so, unless the contemporary marsupials are descended from the earlier forms. It cannot be urged that marsupials are better adapted to the conditions of life in Australia than placental mammals; for the placental mammals lately introduced there are already beginning to supplant and exterminate the marsupials. The only possible explanation is that, whereas marsupials once covered the terrestrial globe, and have been supplanted by better adapted forms in the Old World and (with the exception of the opossum) in America, on the other hand the isolation of Australia has allowed them there to go on reproducing their kind until the present day. In such an instance as this we have something very nearly like crucial proof of the theory of "descent with modifications." In like manner the extinct edentata of South America are closely allied to the living ant-eaters, sloths, and armadilloes. So, too, the indigenous floras and faunas of islands lying near continents always resemble the floras and faunas of the continents near which they lie. The Galapagos archipelago, distant some six hundred miles from the coast of Chili, has a fauna which, though generically distinct from all others, is yet South-American in type, and closely resembles the fauna of Chili. Again, among the animals living on the different islands of this group, we find specific diversity along with generic identity. On the Darwinian theory this is just what might be expected. The long isolation of the archipelago from the continent has given opportunity for the rise of generic divergences between their once homogeneous faunas; while the briefer isolation of the several islands from each other has been attended by slighter, or specific, divergences; and, as if to complete by contrast the force of the example, we find that the only animals on the archipelago which are not generically different from their allies on the continent are birds, able to fly back and forth over the intervening sea. Unless the Darwinian theory be true, these striking relations not only become meaningless, but it is difficult to see why any discernible relations at all should exist between these neighboring faunas. To cite all the confirmatory facts of this sort would be to write an exhaustive account of the distribution of plants and animals.

In examining the geological record in general, we are struck with its corroboration of the above-cited testimony of classification and embryology. For instance, as we go back in time, we find families and orders drawing more and more closely together; we find earlier forms less specialized than their successors; and as we now have embryonic birds with rudimentary teeth in their beaks, so we find that formerly adult birds with such teeth existed. It is one of the most significant truths of palæontology that extinct forms are generally intercalary between forms now existing, so that not only genera and families, but even orders, of contemporary animals are every now and then fused together by the discovery of extinct intermediate forms. It is in this way that the Cuvierian orders of pachyderms and ruminants have come to be ranked as a single order, the horse and pig being connected by numerous fossil links with the camel and antelope. Until quite lately there has been less success in the attempt to find a perfect series of transitional forms connecting some well-known animal with its generically different ancestor. But the argument heretofore urged against the Darwinian theory, on the ground of this imperfect success, was at best a weak one, as resting merely upon the absence of evidence which further discovery might furnish at any moment. The Darwinian might candidly urge that his failure was due partly to the fragmentary character of the geological record, in which there is no reason for supposing that more than one form out of a hundred has been preserved, and partly to the fact that only a small portion of the earth's surface has been explored by the palæontologist, and that portion but superficially. The justice of such a plea is rendered apparent, while the hostile argument is completely silenced, by the recent discoveries of Professor Marsh as to the palæontological history of the ancestors of the horse. As these discoveries have just been well described in Professor Huxley's admirable lectures in New York, a brief mention here will suffice to show their import.

One of the most striking peculiarities of the equine genus — including the horse, ass, zebra, and quagga — is the modification of the limbs, so that what appears to be the horse's fore-knee is really his wrist, and what in the hind-limb looks like a reversed knee is really his heel, while the lower halves of the legs are really feet terminating in the middle toe armed with its nail, which we call the hoof. The two adjacent toes are represented only by splint-bones on either side of the middle metacarpal or metatarsal, and the radius and ulna in the fore-limb, as well as the tibia and fibula in the hind-limb, are almost completely fused together. Now according to the Darwinian theory such a highly specialized animal as the horse must be descended from a less specialized mammal in which the limbs were like ordinary mammalian limbs, ending in ordinary feet with five separate toes each. The embryology of the horse points to this conclusion, and here, as usual, but with unwonted emphasis, palæontology confirms the inference. Already in Europe had been found the three-toed hipparion, in which the two side toes were like dew-claws, and the older anchitherium, in which all three toes were complete. But the discoveries of Professor Marsh have set before us a much more perfect series. Going back in time, as we reach the upper Pliocene, the horse disappears, and we find the pliohippus, very much like him. In the lower Pliocene this creature is replaced by the protohippus, with three toes like the hipparion. In the upper Miocene we have the miohippus, with three well-developed toes like the anchitherium, and with the rudiment of a fore-toe on the fore-foot. In the mesohippus of the lower Miocene this rudiment is a splint-bone, like those which represent the later-disappearing toes in the modern horse. By this time we find the ulna and fibula well developed and distinct from the radius and tibia. Still further back, in the upper Eocene, comes the orohippus, with four complete toes on the fore-foot. And finally, in the lower Eocene, we get the eohippus, which shows the rudiment of a fifth toe on the front and of a fourth toe on the hind foot. In the structure of the teeth — the other chief point in which the modern horse is notably specialized — we find a similar gradation back to the ordinary mammalian type.

The agreement of observed facts with the requirements of theory is here complete, minute, and specific; and Professor Huxley may well say that the history of the descent of the horse from a five-toed mammal, as thus demonstrated, supplies all that was required to complete the proof of the Darwinian theory. The theory not only alleges a *vera causa*, and is not only confirmed by the unanimous import of the facts of classification, embryology, morphology, distribution, and succession; but it has further succeeded in tracing the actual origination of one generic type from another, through gradual "descent with modifications." And thus, within a score of years from its first announcement, the daring hypothesis of Mr. Darwin may fairly claim to be regarded as one of the established truths of science.

JOHN FISKE.

ART. VI. — THE EASTERN QUESTION.

THE title of this article is the name of the oldest existing problem in European politics. All the questions with which the diplomatists of the seventeenth and eighteenth centuries were plagued, except this, have been settled in one fashion or another; but this remains, and is now apparently more difficult than when it first presented itself. The humiliation of the House of Austria, which was the aim of Continental reformers at the close of the sixteenth and the beginning of the seventeenth century; the humiliation of France, which was their aim during the latter part of the seventeenth and the beginning of the eighteenth century; and the reduction of the Pope to a condition of harmlessness, which has been one of their dreams for fully three centuries, have all been accomplished. Indeed, if we look at the points of the Grand Design of Henry the Fourth, as set forth by Sully to Queen Elizabeth, — "the restoration of Germany to its ancient liberty

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IS THERE A PHILOSOPHY OF EVOLUTION?*

(First Paper.)

I have no sympathy with those who complain because philosophy is forever unfinished and is always beginning its work afresh. In the eternal youth of human problems lies the assurance that we are in the great world of the Spirit, whose life only an eternity can fulfil, and whose concerns no human reflection can exhaust. To be sure, this eternal youth of philosophy never develops healthily in any generation of men, unless they look backward upon the history of preceding generations; and no fresh beginning is worth making, unless the ages have fertilized the forest soil where the new saplings are to grow. But the endlessly unfinished task of philosophy is still justified in its very incompleteness by the fact that philosophy itself is, after all, only an effort towards a passionless and yet truthful comprehension of the deepest passions of humanity; namely, of the passion for knowing the things that are in the world, and of the passion for serving the worthiest ideals.

These passions, which philosophy analyzes and reflectively criticises, are not dead things, but living interests. They grow with man. Their issues vary endlessly from age to age, amplify and complicate themselves as life expands, begin afresh where they had once ended, and so furnish an unceasingly altered world, wherein the philosopher has to find his way. He seeks (for so he says) eternal truth; but the truth *as* he seeks it is human truth,— God's ways seen in the flying mists of men's thoughts. His instantaneous photographs of human passion have, indeed, a fixed and unalterable appearance about them. The most transient desire or hope of his age, fixed by the technical devices of his system, pretends to be something demonstrable and unalterable; and, because this particular shadow of passion, this one attribute of mankind, is not found in some other and later system, whose photograph is equally the product of the moment, critics declare that no two philosophers see the same truth in the world, and that all these expressions of humanity are alike worthless. In fact, however, if it is worth while to live, it is worth while to reflect upon life; and philosophy, which is merely the most thorough-going reflection possible upon the presuppositions of human thought and passion, exhibits, in the variety of its doctrines, only the wealth of the life-treasures of humanity, not, as some have supposed, the poverty of the reflective skill of the philosophers.

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*An essay read before the Yale Philosophical Club by Professor JOSIAH ROYCE, of Harvard University, under the title, "The Fundamental Problem of Recent Philosophy."

I will not make too much of an imperfect parallel; but, suppose (since, after all, artistic and philosophical reflection upon life are not absolutely opposed to each other) that poets were accused of cultivating a vain art, merely because not one of them had yet written the whole secret of man's heart in one final lyric: would not such an accusation resemble the fashion of those who scorn philosophy because the human spirit has not yet finally unlocked its heart with the key of any one philosophical system? Nay: in each truly philosophical age, the great thinker, who is master of his passing world, *does* unlock this heart, and become possessed of many of its choicest treasures. But in the times between, when passion lives intensely, and the heart is darkened from reflection by the serious toils and travail of life, humanity stores new treasures of experience in the mysterious hoarding-places; and, when a reflective age comes again, the house is still there, but that which is within it has been altered. Hence each constructive period gives us its own philosophy. The work is indeed endless, but it is not therefore in vain.

Our own time, one of peculiar energy and of considerable reflection, seems to me to stand in the presence of philosophical problems which, without being altogether novel, have assumed unexpected and even highly surprising forms. I feel myself wholly unable to set forth these problems, either exhaustively or worthily, in any brief space; but the opportunity which this paper affords me must not be allowed to pass without an effort to suggest what seems to me to be the shape assumed in our day by the most fundamental of philosophical problems,— that of the ultimate nature of Reality. To this end, let me introduce my discussion by a brief historical sketch, which may seem to most of you a tedious, because a far too familiar, preliminary, but which I shall find useful, I fancy, in trying to make clear my views in the concluding division of my paper.

I. NATURAL LAW: THE MECHANICAL VIEW.

Modern Philosophy, as it began in the Seventeenth Century, worked under the influence of the presuppositions of a time when success meant despotic mastery, and when tradition was of less importance to the nations than were intellectual skill and physical force. The Seventeenth Century had forsaken Mediævalism, and had not yet invented the ideals of national unity or of popular government. Men asked, "Who is our master?" In the Middle Ages, such questions had answered themselves. The emperor is our master, or the pope or the feudal lord: so people had said according as time and land had determined. But now the question was more doubtful; and yet the people could not say, as in our time they have learned to say, "We, the nation, under our chosen King or Parliament,— we are the masters," since men were looking up to that master whom external fortune preferred. The master, then, was the triumphant Protector, or the king by right divine, or the successful conqueror; in short, he was the despot, the Leviathan, the man on whose side were by chance the strongest battalions. Armies were often constituted of mercenaries. War was an affair rather of money and ambition than of national passion. People hated the soldier as an alien, even when he fought under their own flag. A king might have to conquer his own land as if it were another's. A conqueror annexed a province as he would have appropriated a treasure, not because he thereby built up a national unity, but because he thus increased the sum total of his revenues. Political affairs were too often divorced from national feeling. In Germany, the battle-ground of Europe, national feeling was indeed for generations almost extinguished by the physical forces beneath which this age of despots buried a suffering people.

The philosophy of this age is usually and wrongly characterized, by those who undertake to describe it, as a philosophy whose principle was Self-consciousness. Too much, I think, has been made in just this connection of the Cartesian "COGITO, ERGO SUM." That was a weighty saying; but one may complain of its development in the Cartesian system, much as Socrates in the *Phædo* complains of the abortive teleology of Anaxagoras. "I read in Anaxagoras," says, in effect, Socrates, "that the *Nous* causes all things. Herein I rejoiced. But I read further, and found that, when he came to speak of man, he explained him by describing his bones and sinews, which are surely not the *Nous*." Even so Des Cartes appeals to self-consciousness as the norm of truth. But erelong he begins on his physics; and we find that now he has altogether given the go-by to self-consciousness, which has no more to say in a world where all is voiceless and geometrically unreal.

In Spinoza, Self-consciousness not only has no voice, but clearly sees why it has no business to break the everlasting silence. At the outset of the search for truth, it indeed eloquently longs, as at the beginning of Spinoza's *Tractate on the Improvement of the Understanding*, for rest and self-realization. Erelong, however, it discovers that truth must not be reflected upon, but must be merely seen and accepted. At this Self-consciousness takes its solemn resolve, "From this time forth I never will speak more"; and, in fact, no torture ever opes its lips thenceforth until its mystic euthanasia in the Fifth Part of the *Ethics*.

Self-consciousness, then, was *not* the principle of the new philosophy, any more than freedom was the guiding angel of the atrocious Thirty Years' War, or any more than democracy in the modern sense was the creator of Cromwell, or any more than patriotism or a true national consciousness found expression in the wars of Louis XIV. The principle of the new philosophy was one of dictatorship, of despotism, of absolute mastery. To be sure, just as Europe no longer went on crusades, or gave true allegiance to the Emperor, Cæsar's successor, so modern philosophy was no longer the handmaid of theology. But when the traditional master gives place to the Leviathan, when you behead Charles I. and find in his place Cromwell, when you forsake the Holy Roman Empire and submit to Louis XIV., you are not any freer for the change. On the contrary, the freedom of tradition is gone; you are in bondage to the last chieftain who has found the way to make war nourish war, and who has sacked your city. So, too, in philosophy you may be free from the scholastic forms of disputation, but the geometrical method, with its armed array of hungry propositions, devours all the interests of your life that chance to oppose its leading axioms and definitions. Is it a Hobbes who conquers your citadel? Lo! his system has chained every impulse of your heart. You are a hopelessly selfish creature; a member of a race that, save for its possession of reason, is worse than the wild beasts; a race whose natural state is an inconceivably horrible warfare. Is it some Cartesian occasionalist whose principles have bound you? Well, then, animals are unconscious automata; and, as for you, you have no part in raising your own arm. God's miraculous power interferes in every one of your acts, and your daily life is clearly and distinctly shown to be a mystery more perplexing than the doctrine of Transubstantiation. Such is the fortune of philosophic warfare. You may be disheartened, but you must submit.

The first significance, then, of this initial age of modern philosophy lies in its development of the conception of merciless philosophical demonstration on the basis of assumed principles. The model of philosophy was that very method of coercion which characterized the political life of the time. As the *de facto* Ruler called God to witness that heaven was on his side, and that all good men were bound to submit to his will, so the *de facto* Principle in a system of philosophy assumed a divine right to rule with absolute and unsparing consistency in every region of human life. But I hasten to add that a second significant feature of this age related to something much deeper than the form of the philosophic system as such. Deeper than the outward show of despotism in the political world was that longing for an absolute solution of the problems of confessional and political sovereignty, which led people thus to serve arbitrary leaders in the hope of finding at last the strongest leader, and so of accomplishing a final conquest of all pretenders and heretics. Even so in philosophy, the pretentious geometrical method which in Spinoza's *Ethics* so often wearies us with its mere simulation of necessity, and which so often gives us empirical generalizations under the guise of rational demonstrations, is, after all, only an effort to express, even in the external shape of the system itself, a profound belief that the true world is absolutely fixed, necessary, motionless, eternal. Absolutism in the form is only the phenomenal manifestation of a faith in an absolutism of the content. Government *ought* to crush, *will* crush, all heresy and treason. There is only one ideal state. If we but conquer the provinces long enough, extinguish the enemies vigorously enough, we shall some day reach the ideal, and Europe will be organized. Even so, the truth about the world is that it is one objective system, complete, everlasting, necessary. Only try long enough, with your geometrical method, and you will at last come to rest in the contemplation of this world of Law.

Yes, LAW, that fundamental conception of the Philosophy of Nature, first assumed its modern shape in the philosophy of the Seventeenth Century. The growth of science since Galileo gave the empirical basis for the new notion. The ancient synthetic geometry had known what law meant as applied to space. The nature, that is, the one simple law of the structure of a geometrical figure, could be developed by the addition of auxiliary constructions in such a way as to exhibit, in necessary and orderly sequence, a vast number of apparently diverse and disconnected properties of the figure. Even so, for the Galilean method of induction, the law of nature was to express, in the form of a simple principle, many empirical facts. At the outset of science, nothing was sure to the investigator but that nature was the expression of principles. These principles appeared in the doctrine first as hypotheses. Deduction developed the consequences they ought to have if they were true, and experiment verified these consequences by the study of facts.

The Columbus's egg of Galileo's method lay in his discovery of a plan by which the necessity of geometry could be applied to the examination of natural facts. In earlier speculations, either the principles assumed had been vague, mystical suggestions, or the investigators had been obliged to collect facts without being able to discover more than the most insignificant principles. In the age preceding the development of modern science, such theories as the doctrine of signatures in medicine show us what was necessary, so long as principles unapplied to facts were the only resource of speculative science; while, on the other hand, rough, imperfect observations, which could be of value only to the artist or to the artisan, constituted the whole of growing empirical science. It was Galileo's discovery that, if principles were stated on the basis of suggestions already given by the facts of nature, if they were stated with the exactness of which the Euclidean theorems were already the model, and if the geometrical method were applied to deduce such consequences from these principles as could be tested by experience, then, and then only, natural science could assume a form at once well founded in facts and rational in its expression. The success of Galileo in elementary mechanics first showed men what the possibilities of science were; and very rapidly the speculative thinkers of the Seventeenth Century seized on the suggestions of the new method. A sort of romantic delight in mathematical necessity characterized the whole thought at the time. "We have wandered so long in mysticism without knowing how to question nature, we have revered so long the rigidity of geometrical science without being able to imitate its clearness! Now at last," men said, "we have found the royal road to truth. A nature whose laws the Galilean method can investigate must be a nature where necessity is universal. Surely, the distinction, then, between science and mysticism lies in the fact that science is geometrical in its form and verified in its content, whereas mysticism is inexact in its form and unverifiable in its assertions."

The high hopes aroused by the early successes of elementary physical science rather grew than faded as the century advanced. The most picturesque triumphs of the modern intellect belong, in fact, to the period from Galileo to Newton. Never again will it be possible for human thought to seem at one stroke to conquer the heavens, as the Newtonian method did; and, although the great philosophers of the Seventeenth Century did not live to learn the scope of the Newtonian science, they were already able to anticipate that some such triumph was near. They were not slow to follow the model of the special investigators in forming their own philosophical systems. And so the conception to which the Seventeenth Century leads us is the conception of a world where an infinite number of facts are bound together as cases of simple principles, in such wise that if the principles are once discovered, through patient induction or skilful ingenuity, the most unsuspected connections between remote facts of nature may be expected to result, and the most minute data of experience may become explicable.

I think that in estimating the work of the Seventeenth

Century sufficient stress is not laid, in most historical studies of modern philosophy, upon the transformation thus given to the conception of natural causation. Modern discussion upon the nature of causation (especially in Great Britain and in our own country) treats the problem as if the idea of cause had not developed since the time of Plato. For instance, we have the old inquiry as to the nature of the efficient causation exemplified in human will, too often treated by philosophers as if it were the only question about causation. This inquiry, however, bears upon only one-half of the real problem. We find in so recent a writer as Dr. Martineau a disposition to ignore that side of the concept of natural causation in which this concept appears as satisfying the human desire for a simple *explanation* of the complex facts of the world in terms of unity. The Seventeenth Century, as most know, ignored efficient causation; or else, as in the case of Des Cartes, admitted the existence of efficient causation in the one case of human free will, but did so for theological rather than for genuinely philosophical reasons. Yet *why* the Seventeenth Century ignored efficient causation,—*why* for Spinoza necessity, and not freedom, seemed the only rational account of even the most passionate human life,—this question is seldom answered. The reason is not far to seek. The Seventeenth Century, as the age of absolutism in philosophy, knew only of sovereign principles; and the sovereign principle that was then in the air was the principle of a new mechanical science, which asked, concerning facts, "Of what law are they cases? what formula expresses their content?" and *not*, "How are they related to human will?" To interpret the world in terms of ideals was not the mission of this age; and every view of causation that dwells on ideal efficiency as its only fundamental characteristic ignores one-sidedly that whole conception of reality which we owe to the Seventeenth Century. It is true that the conception of causality which defines it in terms of that ideal efficiency which we seem to see expressed in the human volition is by no means worthless or unphilosophical. In fact, it is precisely the relationship between these two views of causation that to my mind constitutes the fundamental issue of recent philosophy. But it is without profit that we study the history of philosophy, if we are unwilling to take a one-sided age, with all the defects of its qualities, and to comprehend, in order that we may transcend.

The idea of all-pervading law thus developed did not rest during the Eighteenth Century: it was the principle of the growth of the whole of modern physical science. But, to be sure, reasons which we shall soon further consider led the philosophers of the latter half of the eighteenth century to ignore in great part the later stages of the growth of this fundamental concept. For, by the middle of the eighteenth century, philosophy was no longer under the spell of the geometrical method, and it was no longer interested in reflecting solely upon the ideas of rigid scientific investigation. Absolutism had given place to skepticism. But meanwhile, in the scientific world, the conception of universal law grew, until it received that classic expression in Laplace's *Essay on Probabilities* which has in recent times so often been cited. I call this expression "classic," because, in all its one-sidedness, it has precisely the perfection which it is the privilege of a partial view of reality to attain. Every one has read the brilliant restatement of Laplace's view in the famous address of Du Bois-Reymond. Here you have a world-picture in which, indeed, there is no room for an ideally effective element, but in which the demand for explanation of all that is rationally and finally explicable is supposed to be fully met. There is no longer speech of an efficient causation: the facts of the world are cases of a universal formula. He who knew all things would know all these facts in their unity, and, having this unity, would have all things. The moments of the world would be to his mind only states of a continuously varying function. At each instant, the facts of nature express what happens in the formula, if you substitute some value of the time-variable *t*. A world of constant elements, of continuous variations, and of fixed laws governing these variations, expresses all the wealth of the infinite life. There is no question of whence or whither. At each moment, the tale is complete.

> "Of earth's first clay they did the last man knead,
> And in the morning of creation wrote
> What the last day of reckoning shall read."

In this suggestion of Laplace one finds the expression of a theory for which even Spinoza had known no sufficient words. The Laplacean World-formula is, after all, simply what the Spinozistic Substance aims to be. Spinoza's God is, in intent, an incorporated world-formula, the objective unity of Law, wherein infinite things find their expression. This unity is complete, and predetermines all from the essence of its nature, just as the essence of a triangle determines absolutely even the least of the properties of the figure. Spinoza thus struggles frequently for a clear and simple statement of what Laplace, with the aid of mechanics, easily sets before us; and I can conceive Spinoza following with delight the growth of the conception of the unity of nature through the mathematical writers from Newton to Laplace. I could even fancy him finding still further satisfaction in seeing a similar theory applied by Fourier to the facts of the theory of heat, and in our own time, by a company of brilliant investigators, to the facts of the conservation of energy. It is the fortune of great conceptions that they wait long for a complete expression, and are the prophecy in the growing age of what less original periods develop with more rigidity and greater clearness, though frequently with less genius.

In fact, the Spinozistic system of the universe could never have been stated with its maximum of clearness by any thinker who lived before the modern development of physical science. This is the significance of Spinoza,— that he longed for that of which the conservation of energy is a partial but vastly imposing empirical fulfilment. And, when I say this of Spinoza, I do not attribute to him any supernatural prescience. I only say that the presupposition of his system,— the substantial, objective, mathematically perfect unity of nature,— as on the one hand it was founded upon the model of the Galilean physical science, so on the other hand received a fuller expression in the recent outcome of the same physical investigation.

II. EVOLUTION: THE HISTORICAL VIEW.

But now, having thus characterized the first great age of modern philosophy, I must for the moment skip altogether any mention of the great development from Hume to Hegel, and point out forthwith the remarkable contrast between the spirit of the Seventeenth Century and the spirit which has developed in Europe during the present century.

If Spinoza were alive to-day, with one portion of our modern science he would be not only at peace, but delighted; and what that portion is I have just indicated. In so far as we have discovered necessity and eternity in the world, and have realized this eternal necessity in the form of empirical laws, he would observe only an expected verification of his systematic presupposition; and he would rejoice to find the Divine Substance expressing itself so easily in sensuous forms. But with another element of our modern investigations Spinoza would be much puzzled. I refer in particular to the modern notions of EVOLUTION. If there is anything at which the Seventeenth Century philosopher would be surprised, it would be to find the people of this time investigating the past history of the universe. History was once for all disposed of in the Seventeenth Century. Of the world's history one knew very little, and cared still less. Creation was probably a myth. The social compact, on which so many political theories were founded, was little better than a myth. It served the purpose of a convenient construction for social institutions, similar to the mathematical construction of the ellipse and parabola as sections of a cone; but historically it had no significance. Even Hobbes or Locke might be found ready enough to admit that no definite moment could be mentioned in the past, when the "social compact" actually first took place. As for the more recent history of humanity, the Middle Ages were lost, so men felt, in deserved darkness; and forgetfulness hid at once the bad Latin of unreadable scholastics and the decrees of insignificant popes and emperors. The new time had its own great issues, which were to be met by its own great political and military forces. The occult theories of the Renaissance period were also to be forgotten. The philosopher and the man of science worked for clear conceptions, for rigid demonstrations, for definite verifications, and for mathematical certainty. History concerned them not, except as a literary exercise, as the occasional amusement of an idle hour, or as a storehouse of moral reflections.

But now contrast this view of the world with the one to-day prevalent, when, as many men say, "the history of things is the explanation of the nature of things"; when, as many popular leaders assure us, "if Evolution is anything, it is everything"; when our first inquiry concerning any problematic fact of nature is, "What is its source?"

This view of the world stands in yet stronger contrast to the notions of the Seventeenth Century, when we reflect that it has given expression to itself in a pretended PHILOSOPHY, and when we perceive that the development of this view is contemporaneous with precisely that conception of physical necessity which has characterized modern physical science. Just at the very moment when the presuppositions of the Seventeenth Century have met, in the doctrine of Conservation of Energy, an unexpected realization of what were once their wildest hopes, a new view of nature, expressing itself in the so-called law of Evolution, has appeared in the world side by side with the doctrine of physical necessity; and those who uphold this theory of Evolution are curiously unconscious that ***the world where history is the most significant of intellectual concerns is simply not to be reconciled with a world where there is no history, and where the world-formula has already expressed from eternity to eternity the transient facts of the flying moment.*** I hold that in this appearance of the doctrine of Evolution, not merely in empirical science, but in philosophy, in this concept that the history of things is a necessary part of their true comprehension, modern thought has reached, in a novel form, an ancient but profoundly important issue; and it is this issue which I regard as the Fundamental Problem of Recent Philosophy. The significance of the matter must, however, be made plain by a further analysis.

The difference between the Seventeenth and Nineteenth Centuries may first be expressed in general terms by saying that for quite a while our thinkers have been deeply interested in the history of things, whereas the thinkers of the Seventeenth Century simply felt no such interest. In other words, facts have become fascinating to us, which they ignored; and we have become acquainted with the existence of Evolution, not because we were so much more brilliant than our predecessors, but because we have been deeply concerned to discover the existence of Evolution.

This modern interest in the law of Evolution begins, in the first place, with the New Humanism of the last century; owes its origin, in fact, to Rousseau, whose sentimentalism, directing attention to human nature, forced upon men the examination of human life as life. From Rousseau to the Romantic School in Germany, in England, in France, there was a necessary progress,—a progress not unaffected by the intense life and the tremendous issues of the French Revolution. The year 1815 found the nations physically exhausted, and intellectually prepared for a fuller reflection on the problems of their life. As young people, after the first great experiences of passion, turn from the sorrows of life to an historical reflection upon their own destinies, and fall to writing diaries, so the new Europe, deeply concerned to comprehend its own heart, and deeply affected by the problems of the recent days, began to examine its own past, and to write the diary and the autobiography of humanity.

It is surprising how rapidly, after the period of the Napoleonic wars, one finds the historical movement growing throughout Europe. It not only concerned itself with political history, but seized upon law, institutions, literature, language. Erelong it invaded the citadel of theology. In natural science itself it found an expression in the rapidly growing discoveries of geology. By the middle of the century the main interest of the world was historical. Darwin's work was only a culminating achievement, which bridged over in a measure the great chasm between geological and human annals. What triumph might not now be expected from the wonder-working historical method? If one can conceive the tremendous impression that would have been produced upon the public after the age of Newton by such a discovery as the Conservation of Energy, and if one compares with this the great indeed, but still relatively insignificant impression produced upon our time by that stupendous advance in physical knowledge, one sees indeed that our complex century had new concerns. This age was not merely destined to fulfil on the one side the highest hopes of the physical philosophers of the century of Spinoza and Newton, but it was also ordained to undertake new problems. The "Law of Evolution" has even displaced, in the popular imagination, the law of the Conservation of Energy itself, and appears as the great central doctrine, to which the doctrine of Conservation is only tributary. The aforesaid faith that the story of things is the only explanation of things has thus become almost an axiom of the popular mind.

If such is the general history of the doctrine of Evolution, the philosophical significance of this doctrine is not far to seek. Rigid mathematical explanation was the watchword of the Seventeenth Century; but Evolution, as such, is not, cannot be, a rigid mathematical explanation. For the content of things you can account in mathematical terms if you show how the positions, the velocities, the accelerations, present in one state of the system of bodies, must have given place in the lapse of time to just that new configuration of the system which constitutes the content to be explained. In Taylor's Theorem nothing truly historical about the function is comprehended when we see why a given value of $f(x)$ must give place to a fixed value of the same function of $x + h$. Even so, in the world-formula, no efficient causation determines why a given earlier state of the world passes over into a given later state; and for the same reason there is no true historical interest about this alteration. All these states are lost in the unity of a function; or, if found, receive their existence from that unity, have no significance save as cases of the unity. One cannot ask *why* this happens, or why that earlier gives place to this later. All such questions are made irrelevant by the absolute explanation which connects earlier and later by a rigid law of continuous variation. Evolution and the world-formula, therefore, are simply not coincident terms. In so far forth as the world needs to be expressed in historical terms, it is not the world of rigid natural law. It is precisely this aspect of reality which is lost sight of by those who hastily assume that the scientific doctrine of the transformation of species, and of the growth of the later world from earlier conditions, expresses forthwith a truth of which philosophy can make final use, without altering the postulates of the philosophy of the Seventeenth Century.

What science accepts, precisely that is the object of philosophical inquiry; and the facts of Evolution, as our historical age has determined them, raise for philosophy only a new problem. At the same time that the doctrine of Conservation of Energy would seem, from one point of view, to have verified in great measure the presuppositions of the Seventeenth Century, our age has discovered a mass of empirical facts which seem (as we nowadays interpret them) to go beyond mechanical necessity. And so the new issue for philosophy is: *What has Evolution to do in the world of the world-formula?* What relation can there be between facts expressible in terms of the geometrical method, and the facts whose explanation, such as it is, is their history? So palpable is the difficulty of discovering an historical element in the world of mathematically determinate laws that it seems to me most surprising to find the popular thinkers of our time entirely unaware of the incongruity between the mathematical view of nature, which they on the one hand readily and simple-mindedly accept, as the legacy of the Seventeenth Century and as the outcome of physical science, and that doctrine of Evolution which expresses once for all an interest in things such as the Seventeenth Century could not have shared, and such as mechanical science could never have created.

In the world of the mechanical, historical conceptions indeed have a place, but only for the ignorant. The child, regarding the swinging pendulum, finds its behavior historical. He sees in it, if you will, an evolution or a regress, and rejoices in discovering that the pendulum now ascends, now descends, very much as Herbert Spencer observes in his *First Principles*, with a certain profound delight, that, in the world of the persistence of force, matter now "integrates," now "dissipates," while the physical processes are now those of "evolution," now those of "dissolution." But *if* all the facts are mechanical, *if* they are such as are capable of rigid statement in mathematical terms, no historical account of them has significance, except as an expression of our incomplete knowledge. There may indeed be historical sciences without number in the world of the world-formula, — for those, namely, who, not having the world-formula, are obliged to collect empirical data and to make of them what they can. For us, who cannot explain the stratification of the world's crust as we explain the motions of the planets, the earth's crust appears as a history. But it is for us a history, merely because we do not understand the mechanical facts that here express themselves. If we understood the earth's stratification as we understand the eclipses, the historical element would vanish into the realm of the merely picturesque, precisely as the story of the eclipses forms no part of the facts set forth in a text-book of mathematical astronomy. The oncoming and the flying of the shadow are indeed interesting phenomena; and for the physical astronomer, whose facts are once more not yet mechanically explicable, the series of events in an eclipse may, as series, be significant. But for the mathematical astronomer all the motions of the planets are alike expressions of a universal formula. The historical interest of the events is lost in their mathematical explanation. Just so with the crust of the earth. Were its formation something mechanically explicable in all respects, there would be no inductive and picturesque history of the earth's crust: there would be only mathematical explanation of why the earth's crust is as it is. And so, I repeat, the historical element exists in the world of mechanism only in so far forth as the world of mechanism is not understood. All this, to be sure, leaves an indefinitely great practical range for historical science. Empirically considered, the world-formula is infinitely remote from our definite comprehension, even if it should be universal and all-embracing. Therefore, there will remain, indeed, an indefinitely great scope for the historical investigation of the sequences of the world; and, as the child stands before the uncomprehended pendulum and rejoices in the story of its swinging, so we should stand in the dark world of physical complexity, and admire the sequences of events.

But now all this, while it gives us the indefinitely numerous group of historical sciences of an empirical sort, would still in no wise give us a PHILOSOPHY OF EVOLUTION.

It is one thing to say, "There are events in the world, such as the transformation of species, which, although they are mechanically necessary, have to be expressed by us in terms of historical sequence." It is quite another thing to say, "The history of the world is its explanation." And yet, if one declares that a philosophy of evolution is possible and necessary, he asserts precisely this. Instead of saying as he ought, "In a world of rigid mechanical necessity, history is not explanation, and we find the historical sciences important merely because we do not yet comprehend the mathematical necessity of the facts that they express,—instead of all this, the philosopher of Evolution insists upon it that the history of the world is in and for itself important; that not our ignorance, but our knowledge, is expressed in the discovery of Evolution; that Evolution is not an illusion of our partial view, but the essential truth of things; that the conceptions of struggle and conflict, of the triumph of the good, or of the abolition of evil, of the moral importance of the world, of the transition from lower to higher conditions, are conceptions that express significant and ultimate facts of reality. Yet, surely, this *naïve* belief in the historical as nothing more, after all, than the mechanical — when joined, as it is, with this equally *naïve* insistence on the primary importance of the historical — forms an inconsistency in our modern thought which is distinctly a disgrace to the philosophical acuteness of our representative thinkers. The men of the Seventeenth Century said: "We do not know the ultimate laws of the world, but we know that there *are* ultimate laws; and, as all is necessary, therefore the historical is insignificant. Could we know the history of things, we should not care to learn it. Admit necessity, and for the philosopher all else becomes insignificant. The world of to-day is the world of eternity." But the thinker of our time insists, on the one hand, that there is nothing but rigid mechanical necessity in the world, yet insists in the same breath that there is no knowledge so profound as the knowledge of the history of things. He unites in one book — yes, in one sentence very frequently — these two essentially opposing views of the world.

In all this statement, I am aware that I am running counter to current opinion; but let us observe the matter from yet another side. What is meant by the term *historically important event? It is an event whose significance lies not in its character as the case of a universal law, but whose importance lies in its place in the series of events;* and this place in the series of events is for the historically important event itself no accident, and on the other hand no mathematically determinate truth, but simply a fact of ideal significance. That the world in which Hamlet is born, in which Hamlet is carried on Yorick's back, in which Hamlet loves Ophelia,— that this world, I say, at any stage explains mathematically, mechanically, the world in which Hamlet dies, is of positively no importance to the "History of Hamlet, Prince of Denmark." The whole affair is a history, *not* in so far forth as the earlier stages exhaustively explain the matter, *not* in so far forth as the earlier pass over continuously into the latter, but in so far forth as the earlier stage has an ideal significance with reference to the latter. In case there is a game between the noble and the base, the seeker and the sought, between the world that is out of joint and the man that is born to set it right, then, and only then, is there a true story in Hamlet. That the given function of x passes over continuously from the state in which $x = x$ to that in which it is equal to $x + h$,— this is no history. This is only one way of expressing the eternal nature of the function. If, such as it is, the series is determined by the nature of quantity, it has no ideal character. On the other hand, the series of the states of the world-formula expressed by the successive moments of Hamlet's career are valuable, if at all, *not* as states of the world-formula, but as stages towards the glory and the defeat of Hamlet. One who simply predicted the dying Hamlet from the infant on Yorick's back would know nothing of the action of the play.

And now, to pass from the fictitious to the real, the world *has* a history, and Evolution *is* a reality, only if the real world is a world in which the ideals — not fictitiously, but genuinely — fight battles, prove effective in some portion of phenomenal reality, perform unexplained and inexplicable but ethically significant feats, and win or lose their battles from their own energy. I have nothing to say in this discussion of the empirical sciences of evolution. They are no doubt in the main successful in their inductions; but, from a philosophical point of view, either they are partially and essentially illusory because fragmentary views, relating to an eternal world in which there is no former and no latter; or, *if* they express not merely a transient, but a final element of truth, they do so because this is not merely a mechanical, but also an historical world. If there is not merely a group of sciences having evolutionary interest as empirical sciences, but a true Philosophy of Evolution, this philosophy must be justified by the existence of a true historical significance in reality.

To put the thing in other terms, I have said that philosophy is an effort to express and criticise the presuppositions of its age. Now the presupposition of an historical age is that there is history in the world, and the Philosophy of Evolution is an effort to give voice to this presupposition. If there is anything true in a philosophy of evolution, then there is something more than the world-formula in the world. If there is something more than the world-formula in the world, then this historically significant something must be the existence of efficient ideals. How an ideal can be effective, no causal explanation, no world-formula, can ever directly express. Complete explanation, as the Seventeenth Century saw, must as such be mathematical. In so far forth as causation means the existence of ultimate explanations, causation is as such not efficient. Efficient causation defies mathematical expression. The event that expresses an ideal, in case the ideal is a reality, and not a fiction, is something novel in the world. A world-formula never gave it. The function never admitted of this value. The continuity of its development is broken. There is something new under the sun. The ideal has arrested the "yet unfolding roll of fate," and has made "the stern recorder otherwise enregister or otherwise obliterate." No Taylor's Theorem is the model of the nature upon whose interests the ideals break in. But observe, just *such* breaking of continuity, just *such* incompleteness of absolute explanation, is involved in every assertion that there is any genuine historical element in the world's life. Those who have believed that the spirit of the doctrine of Evolution removed teleology from the world have failed to see that the presupposition of our historical age, ever since Rousseau and the Romantic period, has been that teleological explanations *have* their place, that history is worth studying for its own sake, and that the story of the significant ideals must form a part of every philosophical view of the world. Now here, I say, lies the deepest problem of recent philosophy.

It is wholly impossible to express exhaustively in what sense this view of things appears in genuinely novel form in our day, and in what sense the problem is but the repetition of an ancient issue of life; but still in the time that remains I may venture to make a few suggestions as to the relation of this fundamental problem to the special undertakings of philosophy in our time.

III. CONFLICT OF HISTORICAL AND MECHANICAL VIEWS IN PSYCHOLOGY.

The science where philosophical interpretation and empirical investigation come into the closest contact is, as everybody knows, the science of Psychology; and it is precisely here that the observant student finds best illustrated the present aspect of our problem. Just here, in fact, the historical or evolutionary element, which the Psychology of our time constantly recognizes, is in most crying opposition to a mechanical conception of Reality.

The notion of natural law in Psychology is for that very reason one of the most complex and confusing of modern notions. It may be said that in the average text-book of Psychology one finds as many as half a dozen different conceptions of what constitutes the nature of the mental process and what constitutes the essence of psychological law. But in the most careful writers at least *two* concurrent and conflicting notions of the nature of psychological law are to be found side by side. I know, in fact, of no writer who more frequently illustrates these contradictions than the distinguished thinker Wundt, in all his psychological writings. The two notions in question may be thus expressed: The connections between mental states are first assumed to be in part of the type illustrated by the mechanical laws of nature. I have certain ideas in my mind now, because certain mental states preceded. Such or such being the mental phenomena, and such or such being the external conditions to which the mind is subjected, these or these changes must needs have taken place; and the past mental conditions *must* have given place, through associations, through revivals, through suppressions, to *this* present complex of ideas. So far, psychological law is conceived after the model of the laws of moving matter. As one configuration of the system gives place to another, either with or without the introduction of new bodies and forces, so one condition of mental life mechanically produces subsequent ones, with or without the aid of external stimuli. Now, were mental life an unconscious process, which we only observed from without, we could be satisfied with such accounts. But, unfortunately, mental life not only occurs, but is *our own;* not only passes before us, but has *significance for us.* Our own conscious significance itself lies in the relationships between our successive mental states. The beginning of a thought and the end of the same thought, the premises of a syllogism and the conclusion of the syllogism,— these are indeed examples of mental sequence; but the doctrine which explains the sequence as mechanical or necessary, simply does not give any account of the *significance* of the sequence as such.

And this failure of the mechanical explanation to account for the significance of the mental life has a reason much deeper than many psychologists seem disposed to understand. In a mechanically determined series of events, the earlier configuration of the system passes over into a later configuration through a continuous series of intermediate states. At least, mechanical science so conceives the matter. The whole truth is told when the earlier configuration is described, and when the path by which it changed into the later configuration by a continuous passage through intermediate conditions is precisely indicated. In no sense, however, does the series of states *as a whole* form a truth which is in any wise distinct from the whole truth about the successive states as such. Describe the successive states, and you have described the whole series. The whole is the sum of its successive parts. But now, unfortunately, you in no wise describe the nature of a slowly formed judgment or of a syllogism, if you merely describe the successive mental states that pass through the mind of one as he reaches the judgment or performs the act of reasoning. Understand all these momentary states and the law of their sequence, and this knowledge is no knowledge of the whole process, whose significance lies in its character as a successive *whole*, and not in its character as a sum of successive *states*. An illustration will make my meaning clearer.

A phonograph records and at pleasure reproduces an intelligible series of sounds. Reverse the motion of the phonograph, and the same series of sounds becomes an unintelligible jargon. The reversed phonograph gives you perfectly all the sounds, but loses their significance. Physically described, the two processes, the direct and the reverse, differ only by the substitution of a *minus* sign for a *plus* in the physical formula by which you describe the revolution of the phonograph cylinder. But, from the point of view of the intelligibility of the series as a whole, the alteration is much deeper, and cannot be described in terms of *plus* and *minus*. Even so imagine that the psychological series of the states of a conscious thinking person were described perfectly in terms of some world-formula, so that the earlier portion of the history of his mental life produced of necessity, according to mathematical laws, the later portions, due account being given of the external stimuli which interfered with the process. Having thus described in mechanical terms the whole psychical life of some person (let it be Caius), let us suppose that a physical process occurs in the world which differs from the processes that produced Caius in a way that may be described mathematically by substituting *minus* for *plus* throughout the mechanical formula that describes Caius. This condition of things is mechanically quite conceivable, just as a reversed phonograph is conceivable. The resulting psychical individual will now have in his life all the elements of the consciousness of Caius, but they will come to him in reversed order. In other words, Caius will live his life backwards. Beginning with old age, he will return through the whole series of his mental states to infancy. Observe, I do not mean that he shall repeat backwards the words and ideas of all his sentences, repeating each word and idea precisely as he did in the first place. This would be no true reversal. Not only each word, but each element of each word, must be not only *repeated*, but *felt* backwards. Did he make love? He shall make it in all respects, sentimentally and logically, in an order precisely the reverse of that in which he made it originally, every element of every mental act being in every respect inverted in its connections. Mechanically, you see, the new Caius will differ from the old one in a perfectly simple respect (namely, by the substitution of *minus* for *plus* in his formula). Logically, consciously, he will differ from the old Caius absolutely. His life will be not merely inverted in significance. It will have *no* significance. The most chaotic flight of ideas of the most advanced maniacal patient will be nothing to the absolute senselessness of the inverted Caius's consciousness. The new mind, as conscious mind, will differ from the old mind in respects for which the difference between *plus* and *minus* is absolutely no expression. As the inverted phonograph is not English backwards, but absolute jargon, so the inverted Caius is not intelligence somewhat unworthily reversed, but the profoundest nonsense. No jelly-fish but will be superior to the inverted Caius.

Now I use this fictitious example not as if I supposed that a psychologist who believes in mechanism only would have to admit such an inversion of the life of Caius to be physically possible, but only because I want to point out that, *where* inversion of the series would produce absolute destruction of significance in its content, the significance of the content as read forwards must have been something different from the physically explicable order of the series. Physical processes as such are conceivably reversible, precisely as heat-engines are conceivably reversible. Our physical incapacity to produce absolutely reversible heat-engines in no wise prevents the conception of a reversible engine from having the greatest importance in thermodynamics. But mental life, considered as a consciously significant process, is *not* a reversible sequence; and the laws, whatever they are, that give it conscious significance, when read forwards, are not laws expressible in physical terms. It is precisely for this reason that the laws of the Association of Ideas must always remain inadequate expressions of the nature of mental life.

And, when I say this, I insist, again, that the reason for my view lies deeper than the reasons ordinarily urged against the doctrine of the Association of Ideas. Wundt, as you know, ably opposes the doctrine of Association as an exhaustive expression of mental life. His ground is that there is another process, "active apperception," which works frequently against Association. In this, I think Wundt right; but my present point is not that there are more forces in mental life than the associative forces, but that no forces whatever which determine the existence of any sequence can ever express the source of the *significance* for consciousness of a given mental sequence. Some thinkers like to dwell on our immediate consciousness of the dynamic efficiency of the mind in producing its own states. Though they may be right in this contention, I am not just now insisting directly on *such* dynamic efficiency, although indirectly I myself hold that the facts upon which I am now laying stress require of us, if we accept them at all, the presupposition of a *sort* of efficiency in consciousness which cannot be physically expressed. It is, however, not our consciousness of any mental force at work, whereby (for instance) we fix our attention upon something, that I am now defending: it is the fact that, from a purely logical point of view, the significance of mental life is *not* a mere function of the sequence of its states. Consciousness, as consciousness, exists only in wholes of sequence, never in mere sequences as such. Its unity is a successive unity, which transcends time, and that, too, in every, even the least consciously, present moment. For, even while you attend to any sequence,— as to the sequence of these my words, or to the sequence of waves tumbling in on the beach as you sit by the sea, or to the sequence of the ticks of a watch,— several successive contents, whose sequences, for all that I care, may be mechanically determined, are united for your consciousness into one present fact. The sequence of the states is not the same as your consciousness of the sequence. Hence the laws, whatever they are, which determine the existence of a consciousness of sequence must be *more* than the laws, whatever they are, which explain the nature of the sequence itself.

So much, then, for one aspect of mental life, in which we are obliged to consider it as illustrating a *double* character of certain natural facts. In this case, as you see, the mental facts appear to have not only a mechanical, but also an historical character. They are not only facts in a world-formula, but parts of a story. In the mind, former states are related to later states, first as causes (which might ideally, for all I now care, be expressed in terms of some world-formula); secondly, as forming with those later states wholes of direct consciousness in every moment of our lives. This second relation is not expressible in terms of physical causation or of world-formulas. The world of our mental states has from moment to moment its history, and this history is not reducible to mere sequence. In so far forth as the history has significance, it is more than a causally determined order of events in which the latter pass over into the former. For, once again, the reversed life of Caius, were it possible, would be a causally determined series, but would by chance have no significance, and would therefore be no true history at all.

But this is not the only respect in which mental life furnishes to the psychologist facts which cannot be described in terms of any world-formula, and which mere causation must necessarily ignore. It is, at all events, the universal assumption of every disputant and of every investigator — yes, even of every definite skeptic — that his thoughts have some relation to objects which are external to these thoughts. "A judgment," says Ueberweg, "is a subjective consciousness concerning the validity of our ideas." In every judgment, true or false or doubtful, there must be a reference to something beyond the judgment. As Mill says, "In order to believe that gold is yellow, I must indeed have the idea of gold and the idea of yellow, and something having reference to those ideas must take place in my mind; but my belief is not referred to the ideas: it has reference to the things." Let us consider for a moment the significance of this objective relation of our thoughts.

It is quite useless to declare, as the old-fashioned theories of perception used to do, that this relation between judgment and object is a purely causal relation. I can form judgments about the other side of the moon or about the nature of the space beyond the farthest fixed star, and yet these things stand in no present causal relation to my mind. In fact, if I assert that the number 23 is prime, neither the number itself nor my own activity in counting the number or in examining its properties can be said to be, as physical cause, a sufficient *warrant* for my judgment. The universal assumption of every thinker that his thoughts have some tendency to agree with objects is, then, not merely an assumption that objects cause his thoughts. On the contrary, every idea of causation presupposes this assumption of a primary tendency to an agreement between thoughts and things. I don't first say, "Objects are known to exist because my ideas need causes." What I say is, "There are causes, since certain of my thoughts — namely, my thoughts about causation — have a tendency to agree with objects, and are therefore a sufficient warrant for my belief that there is a causation." In fact, the causes of my judgments are admitted to be pyschologically very complex, and to include many conditions besides the existence of the objects about which I think. Moreover, objects might cause judgments that had absolutely no resemblance to those objects. Causation and resemblance, where the resemblance is of a logical nature, are simply not identical terms. So, then, the necessary resemblance of my thoughts to objects cannot be expressed in terms of physical causation.

In fact, then, the universal assumption of thought is that certain properly tested opinions have an ideal, a teleologically describable, relation to things; that is, that these thoughts are fitted, valuable, significant imitations or representations of these objects. It is impossible to express the theory of truth in other than teleological terms. Unless the relationships of thoughts and objects is such that the significance of the thought bears a teleological relation to the nature of the object, is not merely in physical, but is also in ideal relations to its object, consciousness is a dream, and has no objective significance.

Now, in asserting this, I do not appeal to mere common sense to demonstrate the objective validity of our thought. I point out merely that deeper than the assumption of the truth of the world-formula is the assumption that our thoughts about the world-formula are true. Deeper than the assumption that the psychological laws are in one aspect purely physical is the assumption that in another respect they are ideal, and have a teleological value incapable of expression in terms of the world-formula, or of any physical causation, or of any such Seventeenth Century concept. I do not say that a skeptic is yet answered, who should declare that *no* thought has objective significance. I only point out that, *if* one is dogmatist enought to assert the existence of one kind of objective truth,—namely, the truth of a determinate, describable, mechanical, and causal sequence,—he has already admitted for mental life the existence of an entirely different relationship among the facts of the universe; namely, a teleological relation between thoughts and their objects.

MOTLEY'S CORRESPONDENCE.

Delightful as are the volumes of Motley's correspondence,* it is impossible to read them without a feeling of regret; for with their publication disappears the hope of any adequate life of Motley. We must content ourselves, it seems, with these letters and with the skeleton memoir by Dr. Holmes. The reader of these letters should have Dr. Holmes's memoir at hand. Meagre as it is, it furnishes a thread on which to string the letters. But the possibility was here of a biography of uncommon interest. It need not have been bulkier than these handsome octavos, for from these letters some entire and parts of many others could be spared without serious loss. Hardly can the reader, by clothing Holmes's skeleton with the correspondence, arrive at such a unified impression as could be derived from a biography in which the historian's career and character should be judiciously illustrated by his letters.

For a correct impression of Motley's life it is absolutely necessary to supplement these volumes with Dr. Holmes's sketch. Brief as it is, it brings out in part what is scarcely mentioned here,— the immense deductions from Motley's phenomenal success and happiness made by the circumstances of his retirement from the Austrian and his dismissal from the English Mission. The *Correspondence* gives the impression of a life that hardly knew the touch of misery until the death of the beloved wife. To know fully how deeply wounded and humiliated he must have been, we must reread the account of those events given by Dr. Holmes after we have learned from the *Correspondence* how sensitive he was, how nobly proud, how immeasurably superior to the motives of his political enemies. Moreover, not till we read the *Correspondence* can we measure the in-

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* *The Correspondence of John Lothrop Motley, D.C.L.*, author of *The History of the United Netherlands, The Life and Death of John of Barneveld, The Rise of the Dutch Republic*, etc. Edited by George William Curtis. With portrait. In two volumes. New York: Harper & Brothers. 1889.

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IS THERE A PHILOSOPHY OF EVOLUTION?*

(*Second Paper.*)

IV. THE RELATIONS OF MIND AND BODY.

I have now surely spent time enough in explaining a positive doctrine about mental life. I came here, however, not to defend teleology as such, but to point out a problem of philosophy. Observe then, next, how all this bears on the doctrine of Evolution. I know many thinkers who regret the tendency in our day to apply the doctrine of the transformation of species to humanity, who fear the apparently materialistic results of the discovery that the human mind has grown. For my part, it seems to me of little significance that a man should say that the human mind has grown from animal or even from unconscious physical conditions. What it is important for him to see is that this transition from an unconscious condition to the consciousness of the human mind is inevitably assumed to be an Evolution; that is, a real history, a process having more than mere causal sequence in it. And now I conceive that the same considerations which, as I have shown, lead the psychologist to find in every moment in life more than mere mechanical sequence, must force the Evolutionist to insist upon the doctrine that, throughout the growth from the unconscious physical conditions which preceded organic life to the state of things in which there existed a Shakespeare, there has been all the way along a true history, a process that must be described as that of the self-realization of ideals. When reason grows, it grows because the ideals of reason are effective. When knowledge appears, it appears because the purely logical and ideal conditions, which are necessary to constitute the significance of life, are efficient in determining the series of events in the growth of the mind, in so far forth as this series comes to have significance.

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*An essay read before the Yale Philosophical Club by Professor JOSIAH ROYCE, of Harvard University, under the title, "The Fundamental Problem of Recent Philosophy."

And now, once more, do not misunderstand my intention in making the foregoing assertion. I do not make it because I am especially anxious to prove to you the efficiency of ideals. The ideals are quite able to take care of themselves, and require no apology from me. My interest in this problem is just now the philosophical interest. I insist that in these facts of psychology, and in these presuppositions which the thinker must make about them, philosophy has, in a modern form, not indeed a final and demonstrated doctrine, but a novel and significant problem. Evolution, I say, must *assume* the presence of ideals. Physical science, as such, must *assume* the existence of rigid unvarying causation. Here in psychology the two assumptions meet on common ground. The psychical facts must be caused; the psychical facts must be significant. As significant, they are teleological; as caused, they have no significance. The problem is, *How can these two apparently so opposing doctrines be rationally reconciled?* How can philosophy, whose highest interest is consistency, admit this double doctrine of consciousness? Here in the realm of consciousness one finds, as one reflects, a problem precisely similar to Kant's famous problem concerning the double existence of the Self. "I am," said, in effect, Kant, "at once *phenomenon* and *noumenon*. As phenomenon, I am subject to law, lost in the time-series, a mere succession of determinate conditions. As noumenon, I have moral significance, and, moreover, I transcend time; yes, I am without time." This problematic relation between the two selves Kant advanced as an hypothesis of a purely ethical nature. Our own present consideration forces the double nature of the self upon us as a matter of theoretical presupposition. Unless psychology is to remain a chaos, this double nature of self-consciousness must be not merely recognized, but comprehended. Philosophy as a mere apologist for the noumenal self is, to be sure, wholly out of its office. The double existence of the self, as in time and as transcending time, is not a *discovery* of philosophy. Every intelligent baby, two years old, assumes as much as this even without reflecting on its assumption. But this double existence is a *presupposition*, which to philosophy is a mystery that must be explained, an issue that must be comprehended, a growing contradiction that must be reduced.

And again, as I say, every new study of human life in this historical age forces the problem upon us afresh. I have no lack of sympathy with those who try either to explain the human mind so far as they can mechanically, or who try to trace its past history in the infant or animal. What I perceive is that, with every new explanation, there ever arises afresh the problem, How can this fact which is thus causally explained have at the same time ideal significance? The mystery increases, the philosophical issue sharpens, with every new book on Evolution. The more we know of psychology, the more will the doubleness of psychological law oppress us. There are some, indeed, who are content when, by any device of dialectics, or by such a line of argument as the foregoing, they have defended the existence of the time-transcending, absolute self. Such may be practical men, theologians, or what you will, but so far they are not philosophers. The business of philosophy is not to prove the existence of the noumenal self, but to comprehend the presuppositions involved in its existence. Philosophy is not there to vindicate the ideals, but to make them comprehensible, when once their existence has been, as inevitably it must be, recognized from our modern historical point of view. My purpose, then, in presenting to you the foregoing facts, has been to bring you face to face with the great problem of recent philosophy,— not to appear as an apologist for man's spiritual nature, a nature which is fully able to vindicate itself, and which asks from philosophy not defence, but critical comprehension.

Time presses, but I cannot leave the problems of psychology without pointing out yet another and more popularly obvious aspect which the great issue between the mechanical and the significantly historical now assumes in this science. The connection between body and mind is a favorite topic for research at this moment, as it has so frequently been before; and usually those who now discuss this subject from a popular point of view are anxious to demonstrate either that mental phenomena do actually depend in a causal sense on material phenomena, or else that certain mental phenomena are independent of material phenomena. To prove either the thesis or the antithesis of the great antinomy seems to be enough for popular purposes. Does the mind depend on the brain for each one of its states? Then immortality is abolished, and to-morrow we die. Is the mind in any respect not yet physically explained? Then, at least until nervous physiology takes one more step, we are at peace. Now, to my mind, this fashion of defending one view alone against its opponent is as natural as it is unphilosophical. At the present time, so far as I can discover, we stand in the presence of a fundamental paradox. Both the thesis and the antithesis appear to be equally demonstrable. Nervous physiology, taken alone, makes it already fairly probable that to a great extent our mental life has a physical basis. The proof given by nervous physiology has indeed limitations, some of which have been recently very ably pointed out in a book which is far and away the best of our recent psychological treatises written in English. I refer to Professor Ladd's *Physiological Psychology.* It is tolerably obvious, in fact, as Professor Ladd insists, that the unity and inner causal activity of mental life, as exemplified in the consciousness of each instant of life, cannot at present be expressed as the result of any physical causation. Yet I confess that, when I join to the study of nervous physiology a consideration of the facts of mental pathology, I am forced, not indeed to take up a position which opposes in all respects the fundamental view of Professor Ladd, but a position which somewhat modifies the dualistic doctrines maintained in the admirable closing discussion of his book. For, after all, even the inner functions of consciousness itself are subject, as mental pathology proves, to such thorough-going and profound primary derangements that, for my part, I cannot see any physically describable, any phenomenally manifest part of the mental process upon which we can seize, and declare, " This, as mere occurrence in the phenomenal world, is independent of nervous conditions." Apperception and unification suffer in certain insane conditions as primarily, as directly, as fundamentally, as do the emotions or the senses in other mental derangements. There is an insanity of reason, *paranoia*, where the insane consciousness is irresistibly the prey of a false logic, and interprets correct premises in hopelessly erroneous fashions. There is an insanity of self-consciousness, as clear and primary as the emotional derangements of melancholia and mania, or the sense derangements of hallucinatory delirium.* There is thus no element of consciousness which, in its phenomenal character, is not subject to a derangement of nervous origin. The *Ich als Erscheinung* of Kant appears to be bound fast to the brain. Its highest functions, like its lowest, are in one aspect a mere succession of mental states, and in this aspect they appear to depend absolutely upon nervous conditions. In this sense, therefore, it is true that, as all the mental diseases are very assuredly nervous diseases, so all the mental phenomena as events, in a world of sequent events, are distinctly the product of nervous functions.

But now, while this is true, I, for my part, can in no wise accept it as a final result. For equally true it is that the one element about mental life which nervous functions can never explain is just that element which constitutes the whole inner significance of consciousness. Were consciousness a mere series of events, we should be obliged to say that it mysteriously corresponds as a fact, throughout and in all respects, to nervous functions. But consciousness is not a mere series of events. To the *Ich als Erscheinung* one must oppose the rational *Ich* of the *transcendentale Apperception*. Consciousness is a *significant* series of ideas. And, when I insist upon the significance of consciousness being an element which the nervous system can never explain, I do not mean precisely the same as what I understand Lotze and Professor Ladd to mean by the unity of consciousness, although in certain respects I have no doubt that these two conceptions correspond. For a Spinozist, who maintained as his master did an objective unity of the physical processes, there would be a metaphysical formula according to which the unity of consciousness, in so far as it is simply an event filling indivisible moments of time, might be a series of facts corresponding to the objective unity of the organism. The right of a Spinozist to declare that the material world *has* an objective unity I do not just now question. It is a difficult, but, historically speaking, not an impossible metaphysical conception, which maintains that, apart from anything ideal or teleological, there is an objective unity in things. Spinoza's Divine Substance is One, even on its extended side. Space for Spinoza was a real unity, an objective, indivisible organism. Even so for such a point of view, which I do not accept, but do not just now condemn, the body of a man might be an objective, organic, and still physical unity, in which there should be no teleological, but only causal elements. Spinoza, then, asserted this, and thus undertook to solve the problem of the relation of mind to the body by saying: "The mind is one because the body is one. Corresponding to the objective physical unity in the extended attribute of God is the objective mental unity in the thinking attribute of God." But now every student of Spinoza knows that this doctrine — which, were it true, might conceivably be asserted against Lotze or Professor Ladd —

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* See a recent article by Orschansky in the *Zeitschrift für Psychiatrie*, Bd. XX., Hft. 2, p. 337.

utterly breaks down in Spinoza's *Ethics* at precisely that point where Spinoza is obliged to admit the existence of Reflective Ideas.

My mind may perfectly correspond to my body, even in respect to my mind's unity, *if only my mind will not make itself its own object.* If I can first have some complex thought *in one indivisible instant of time*, this complex thought might be conceived as a mysterious but actual function of my bodily unity; and, if only it were true that I have such thoughts, nervous physiology would force me thus to regard them, or else indeed to give up forming any theory on the subject. But now, if (as is actually the case, and as our own previous discussion has shown) *in each moment of my thought I reflect upon the significance of a previous moment of my consciousness*, my thought may indeed physically depend upon my body, but this *significance* has nothing to do with such dependence. The logical object of my thought is always, in part at least, *not* my body, but my past thought, not my state in this indivisible time-moment, but a sequence of states. The unity of my momentary consciousness might be physically determined, but the logical significance of my thought as a reflection on my own past is not physically determinable, simply because this significance is no event in time at all, but a transcending of time.

In short, then, were my mind a mere series of mental events, even though these events constituted a unity of momentary consciousness, the mind might be physically caused. But the same considerations which a moment ago forced us to say, "Consciousness, even where it appears to be momentary, is not in a physical sense momentary, but fills up, transcends time, is a significant unity, which goes beyond the content of any moment of mathematical time,"—just these same considerations force us now to say, "Every such case of a unity of consciousness, that has a unity in succession, and that transcends time, is wholly incapable of being expressed in physical terms." So, then, to what result do we come? Every atom of consciousness is on the one side, as phenomenal event, dependent on nervous conditions; but consciousness is not the sum total of its atoms. Every momentary unity of consciousness, in so far forth as it is punctually or mathematically momentary, is indeed a function of the nervous system; but every significant successive unity of mental life involves a truth,— namely, just this significance, which can only be expressed in ideal or teleological terms, and which is positively no part of the causally explicable truth of the universe. Mental life, as an event in time, appears to be a function of the organism; mental life, in so far as it transcends time, cannot be such a function.

I might throw some faint light upon such notions as I have on this ultimate problem, were I to add a speculation which has in recent days occasionally occurred to me. Spinoza, as we just saw, tried to express the relation of mind to body by saying that the mind corresponds fact for fact with the state or rather with the unity of the body. Similar views have found expression in recent discussions, though all fail, because, in so far forth as consciousness reflects upon itself, it does not correspond with the body: it corresponds with its own self. On the other hand, to make consciousness, in any respect as a phenomenal event, independent of the body, is to run counter, in so far as experience is concerned, with the facts of nervous physiology and pathology. Why, then, could we not express the relation by saying? — The mind is a Comment on the Teleological Significance of the series of physical states of the body, in so far forth as these states are represented in the conditions of the highest bodily organ, the brain. If one could, then, in some wise suppose this comment to be not simply existent but effective, so that in some respect the brain altered according to the ideal comment that was made upon it, then one would have an expression of the relation between mind and body which would come much nearer to expressing the facts. I do not say that it would be a fully satisfactory conception: I suggest it as a possible one. If the whole business of the mind in this life were commenting on the state and significance of this bodily organism in its unity, then, to be sure, the ideal comment, like any other, would transcend the momentary truth about the bodily state, would anticipate the future or regret the past, would have to reflect, would have to be significant. Yet, on the other hand, all the data upon which the comment depended would be at each moment physically determined. The patient afflicted with melancholia would be, because of the state of his brain, inevitably and fatally disposed to misery, because, with the highest possible conscious free-will, he would then be quite unable to invent for this diseased organism any future condition but one of decay and destruction. The deliriously confused patient would be making a teleological comment upon a disordered brain. Its chaotic functions would be represented in his chaotic condition, as this brain would have even for an angel, and even for an effective angel who should be endowed with anything less than divine powers, only a confused and chaotic significance, the significance of a hopelessly shattered organism. The mind which expressed the comment of the delirious patient would be as chaotic as the brain function. But the point in my very tentative speculation lies, after all, only in this: I am trying to suggest that, whatever the mind is, it has during our present life only this body as the correspondent physical fact upon which its phenomena depend; while, on the other hand, the mind makes of this, its physical object or correspondent, an ideally significant something which the physical nature of the body can never by any possibility express.

If you choose to continue my speculation, and to express in terms of it a possible immortality, you have nothing to do but to suppose this body connected, through agencies of which I need form no special image, with a higher extramundane organism, a spiritual body. You may suppose that the consciousness which here comments ideally and perhaps effectively upon the conditions of this organism, hereafter comments ideally, and as effectively as the divine order permits, upon the significance of that other organism, which may have, if you like, some extremely subtile relation with this one. Such vague speculations have only value, as Kant said in a similar case, "*um die Anmassungen der Sinnlich-*

keit einzuschränken." Philosophy admits fanciful hypotheses, in order that nobody may dogmatize. Philosophy keeps such fanciful hypotheses confined to a narrow range, in order that nobody may presume too far upon human ignorance.

V.— CONCLUSION.

But I return once more, and finally, from the special field of Psychology to the world of general philosophy. What impresses itself upon me, I say, as I examine recent thought, is that those issues which the design argument and the discussion of the freedom of the will have in past times confined to special problems, now cover the whole field of human speculation, and that the doctrine of Evolution is the schoolmaster which teaches us to face at last the real question of the universe. This question is the issue between physical causation and the ideals. From the earliest infancy of humanity, each man has made, in a dimly conscious way, two essentially opposing assertions about the world. The one assertion is that this is a world which needs him, and every other good man, to do work in it, for some end, high or low, human or brutal. The other assumption, felt from the first, and in our days often pretending to speak by the mouth of science, is the assumption that everything in the world is so completely explicable that the ideals are not only unnecessary, but untruthful,— empty comments of the gambler on the fall of the dice of nature. The most of our popular thinkers are, however, at present ardently devoted to the notion that, while the mechanical or explanatory view of nature has finally triumphed, and has displaced teleology, free-will, and all the rest of the ideal activities, the world is nevertheless a world of history. But now, as we have seen, the presupposition of history is, all the while, the Ideal. Unless the series of events in nature is significant as a whole, and gives us genuine stories, it is no history. Whoever asserts, whether in the analysis of a conscious moment or in the history of the Evolution of humanity, that a significant process, involving many successive events, has taken place, asserts also that causal explanation is not everything, and that the teleological view of the world is just as true as the causal. Therefore, as I insist, philosophy is forced, in view of all this, to face squarely the ancient issue in this new guise.

Teleology and mechanism,—how violently they oppose each other! It would appear to be war to the death between them. Again and again each has sung the pæan over its dead and buried foe, yet again and again they have stood, as they stand to-day, with sword in hand, contending for the rational mastery. But to-day each is armed with all the weapons of empirical knowledge. Each lays claim to every fact. Such doctrines as that of the universal conservation of energy insist that all explanation is mechanical, and that nothing occurs which was not from all eternity predetermined by the world-formula. So, I mean, such doctrines assert in the mouths of their popular expositors. Many physicists are far more modest; but the philosophical presupposition in the minds of those who accept these laws is still the same. On the other hand, we find men saying, "The history of a thing is its whole explanation"; and, when they say this, they too often know not what they do! *If* history *is* the only explanation, then no causal explanation as such has any essential value, and the ideals are all in all. Can human thought remain in the presence of these two conflicting views of reality, and still make nothing of their conflict?

But, you will say, in this way I have come here merely to state a problem: I have suggested no final solution of the opposition between teleology and the world-formula. Well, when the solution is a system of philosophy, should I not be presumptuous to undertake to expound one at the close of an evening? To be sure, I have in mind a partial solution of the great issue, but I cannot expound it here. One thing only I venture to point out before concluding my too lengthy address. I passed over, in my inadequate historical sketch, the philosophical movement from Hume to Hegel. I am sure that I am not one who accepts the results of that movement as pure gospel. In fact, I think its most significant doctrines still inadequate to meet the modern issues in their new form. What I do feel, however, is that this great period of speculation, coming as it did between the mechanical philosophy of an earlier time and the evolutionary doctrine of to-day, has an historical significance which no serious philosophical student can afford to overlook. The doctrine of that great constructive age, as you all know, turned out to be a doctrine of Objective Idealism, which insisted that the world is the expression of one all-embracing thought; whereby, to be sure, it was not said that thought is the only element in the life of the Absolute, but that by thought all the rest of the life of the Absolute gets its meaning. To be sure, the greatest thinker of this constructive period, Kant, recognized *his* Absolute only in the practical sense. Yet in essence he was the greatest constructive idealist of them all; and, to my mind, in Kant, and especially in the doctrine of the transcendental self, which finds expression in his great "deduction of the Categories," there lies the beginning of a doctrine which will become more and more nearly equal to the solution of our great human issue.

I say this, not, of course, as if I supposed that this doctrine of Kant, in so far as it is a solution, will ever be expressed by any one man, in a final, absolute form. The solution of the issues of human passion is a progressive solution. In no near time can it reach an ultimate expression, or, if it did, that would be only because humanity had ceased to grow. What I mean is that in some sense we dimly grasp to-day, in novel form, with far-reaching illustrations and in deeply significant strength, a great conflict between the two deepest interests of the human mind,— namely, the interest in Explanation and the interest in the Ideals; and that in his own way and time Kant also understood this conflict, and that he indicated, in his conception of a transcendental unity of self-consciousness, the direction in which human thought must search for a progressive improvement of its position with respect to this conflict. For the rest, the outcome of Kant is essentially idealistic, as subsequent speculation showed. *Consciousness* then is, after all, the great solver of paradoxes. If, for instance, an examination of possibilities could be carried on without consciousness, it would be easy to demonstrate, before the existence of any conscious being, that such a paradoxical creature was essentially impossible; and yet here is consciousness, with all its paradoxes! Assume, then, that the world is the expression of one all-embracing, conscious life, and can you not hope to adapt your doctrine to our present difficulty, the most profound and significant of the paradoxes of reality? So, then, I say, the warfare between the conception of nature as a causally explained whole and the conception of the ideals as the morally significant — yes, as the only significant — elements of reality may possibly some day be reduced towards the far-off state of peace by assuming that both causal explanation, in so far as that is real, and the ideals, in so far as they are effective, ***have existence in and for a Universal Conscious Life, which is the world, and owns the world, and makes and solves its own infinite paradoxes.***

But I have detained you far too long with these vaguely stated issues; and I have come here, strange as that may now seem to you, with a certain practical purpose in mind. These mysterious metaphysical issues may seem very remote from the business of life; and yet, after all, since I stand in the presence of philosophical students, I have no fear in maintaining that this our effort to reflect on life is not devoid of genuinely human and practical significance. Our issues are not invented by ourselves; our paradoxes are not mere dialectical subtleties. Though they be expressed in abstract terms, still they stand for the very things that men think of in the toil and heat of daily life. This issue between the ideal and the explanatory views of things, what more familiar, what more practical element in human affairs? Every day, with fresh hope, in the morning, men arise and go to work, bearing their ideals. Each one feels in his own person "the need of a world of men for me." Every day, worn with the toils and defeats of life, men learn to recognize before evening the iron chains of necessity which bind them. The cruel physical world, which not so much hates as ignores the ideals, and the ideals, which seem to struggle so vainly with the iron necessities,— these make up everyday life. The philosopher desires to know *Why* this eternal apparition of a hopeless contradiction in life is not only necessary, but justified. In the hope of comprehending, he at once simplifies and magnifies the conflict. Common sense sees it occasionally: the philosopher, whose eyes are once opened, sees it everywhere. No philosopher ought to be optimistic, who is not thoroughly acquainted in his own reflective person with the significance of pessimism. No philosopher may venture to say that he has solved the issues of the eternal conflict until he has appreciated the universality of this conflict itself. And what I desire to insist upon to you, as students of philosophy, is that we fail of our philosophical duty if we cheapen the issues of speculation by narrowing their scope, or by insisting hastily upon this or that solution.

Herein, in fact, lies the difference between philosophy and apologetics. The apologist, busy like other heroes in the individual conflicts of life, sharpens his weapons and slays his enemies where he can find them. The philosopher, concerned with the right and wrong of the conflict, must see all, even the ideal interests of men, *sub specie æternitatis.* His solutions must aim to be absolute if they aim to be anything. Do not then, I beseech you, permit yourselves, with regard to these great issues which I have discussed in the present paper, to take easy, one-sided views. It is so easy to say, " Evolution has proved itself true here or there, and many men who believe in Evolution believe also in the doctrine of the universal Conservation of Energy: therefore, the mechanical world is the only world. And, meanwhile, this mechanical world realizes all the ideals that our world needs to have realized. Natural selection creates a better world than old theology ever knew. All is for the best, or will be: the past warfare of philosophy is forgotten, and the world is simple and straightforward." By such devices you indeed simplify your world, but by sinking not only beneath the rank of the philosophical student, but far beneath the dignity of the plainest common sense. For common sense knows that its world is problematical, paradoxical, full of uncomprehended truth, and of bitter conflict. Common sense knows that all is *not* well; and that, if the old theology in any wise erred in not satisfying the longings of the human heart, most modern views succeed no better. The optimism of common sense, to be sure, where one finds it, is fairly justified. It is the optimism of toiling men, who must occasionally forget their troubles, and must become cheerful in order that they may keep up their strength and courage. But the flat, tedious optimism of the average modern popular evolutionist, with his miserable insistence upon the glorious future of a world where "natural selection" shall have killed off all the courageous and serious men, and shall have finally left only those who are able to enjoy themselves, — such an optimism seems to me infinitely contemptible. It is the optimism of a man who has neglected common sense, and who is yet incapable of philosophizing. The philosophcal world is no world for mere cheerfulness. It is a grave world, where problems beset us on every side, and where solutions, if they come, will make new demands on our courage, and test afresh our seriousness, rather than gratify our senses or amuse our ease.

On the other hand, if this cheerful optimism of the popular evolutionist seems to you, as it ought, insignificant, do not, I pray you, make your work in another sense easy by saying at once: "Then, since mechanism fails to meet the interests of the ideal, the ancient teleological philosophy will suffice to express both our theological and our popular interests." No, the true ideals will not soon have the problems of their nature finally cleared up by finite beings. In the infinite world Teleology belongs, I doubt not, within the realm of, the knowable; and the ideals are to be comprehended by philosophy. But the comprehension is not yet complete; the problem is not yet solved; the issues are still pressing; and the ideal philosophy has meanwhile not so much to apologize for the old as to apperceive the new. Philosophy demands of us to-day not easy solutions, but hard work.

I have been especially anxious to lay stress on the novelty of the present situation, not as if the warfare in question were other than ancient, but because the universality of the conception of Evolution in modern times introduces the problem in a hundred places where we did not before expect it. The ancient design argument, and the argument for the freedom of the will, have not, from my present point of view, lost such philosophical interest as they ever possessed. But, in a newer view of the place of design in nature, this ancient teleology will form only part of a far larger system, in which the Divine order will be grasped with a clearness and universality such as our fathers never conceived. Religion is as deeply interested as philosophy in the advance of such a teleological comprehension of things. It is for philosophy, meanwhile, not to give over its own office wholly to the technical apologist for tradition. We cannot admit that any account of design in nature is sufficient, which has not been just to all that the law of Evolution has yet to show us about things.

So, then, I insist that it is a grave and yet an enticing world of problems into which modern philosophy has introduced us. The philosopher cannot make reality, but he can make and shatter views of reality. "Ah, Love," says Fitzgerald, in his metamorphosed stanzas of Omar Khayyâm,—

> "Ah, Love, could you and I with Him conspire
> To grasp this sorry scheme of things entire,
> Would we not shatter it to bits, and then
> Remould it nearer to the heart's desire?"

What the ideals of Omar Khayyâm's fatal world in vain longed to do with the divinely lamentable but necessary order of things, we, the philosophical students, have a right to do with whatever is transient about past human conceptions of this order. The world of any age is seldom so near the real world but that for posterity it will bear having some of its choicest regions "shattered to bits, and then remoulded nearer to the heart's desire." I ask you, not to shatter for the sake of shattering, nor yet to remould for the sake of caprice, but to undertake this work along with your fellows, and to do it seriously, feeling that in endeavoring to comprehend the truth of the Divine order we do God service. And, as for these mysteries and contradictions that so violently defy us when we enter upon the dark plain of philosophical speculation, let us treat them as Browning's hero in his "Childe Roland" treats the uncanny monsters and the trooping shadows of that misty region where lies "the Dark Tower." As he enters there, in the midst of lying enemies, into a world where numberless friends of his former days have met destruction, so we, the philosophical students, wander amidst obscurities, and the deceiving assumptions of human pride, knowing well that numbers before us have met their fate, yet still we seek the "Dark Tower." And, if our end be like the end of Browning's hero, perhaps that also will be none the worse, if to the end, like him, we have kept true. You remember Browning's words. So philosophers ought, if fortune permitted them, to die: —

> "The dying sunset kindled through a cleft:
> The hills, like giants at a hunting, lay,
> Chin upon hand, to see the game at bay,—
> 'Now stab and end the creature — to the heft!'
>
> "Not hear? when noise was everywhere! it tolled,
> Increasing like a bell, names in my ears
> Of all the lost adventurers, my peers, —
> How such a one was strong, and such was bold,
> And such was fortunate, yet each of old
> Lost, lost! one moment knelled the woe of years.
>
> "There stood they, ranged along the hillsides, met
> To view the last of me, a living frame
> For one more picture! in a sheet of flame
> I saw them, and I knew them all. And yet
> Dauntless the slug-horn to my lips I set,
> And blew '*Childe Roland to the Dark Tower came.*'"

JOSIAH ROYCE.

THEODORE PARKER.*

Theodore Parker is the popular representative of an influx of new thought into Unitarianism, and of a new impulse and energy imparted to its ethical gospel. The first large period of Unitarianism closed with Channing, and up to Parker's time its business was mainly to affirm anti-Orthodox or anti-Calvinistic teachings. These were found in new readings of the New Testament, and especially in a nobler and truer conception of human nature and of the relations of man to God. All the earlier efforts to show the errors and cruelties of Orthodoxy and to set forth the promises of the better faith had been magnificently summarized by Channing, the moral grandeur of whose affirmations had advanced Unitarianism, intellectually at least, to a bold and commanding position. Nor was Unitarianism all the while strictly polemical. It was philanthropic, also; and in nothing was Channing more sublime in expression, and a more permanent authority, than in his great discourses upon social morals,—labor, culture, education, temperance,—and, in general, upon intellectual and political freedom. What indebtedness Parker felt to this great man he has repeatedly expressed in his journal and correspondence, and especially in his sermon upon Channing's life and services.†

It was during these times, when Transcendentalism was leavening the New England mind, when the German philosophies and the varieties of Biblical criticism were getting in vogue, and in our liberal schools men were at work upon the task of elucidating the history and traditions of Christianity, that there appeared among us a prodigy of learning, a rugged, warm-souled, eloquent preacher of piety and righteousness, ruthless of popular Christian traditions, a terror to the Church and clergy alike,—Theodore Parker. He

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* From a discourse read in the Channing Hall Course, on "Unitarianism" (1888-89).

† Found in Dr. Clarke's selections from his writings, published by the American Unitarian Association.

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PROCEEDINGS

OF THE

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EVOLUTIONARY IDEAS IN CREATION.

BY

LEAVITT H. HALLOCK, D. D.

Robert Ingersoll says that on the 20th of February, 1809, two babes were born—one in England and one in Kentucky. The mission of the one was to break the chains of slavery, and his name was Abraham Lincoln. The other broke the chains of superstition and changed the thought of the world; his name was Charles Darwin.

It cannot be denied that Darwin did run a gleaming plowshare through the incrustations of scientific tradition, and essentially revolutionized scientific thinking, even among those who dissent from his ultimate conclusions and inferences.

Theologians, limited to certain special lines of investigation, took early alarm lest Darwin had eliminated a personal Creator from the Universe. It was a repetition of that which followed the declaration of the Copernican system of planetary motion, and the laws promulgated by Kepler. Has not the time about come when the world shall cease to be inflicted with books which are an offense to modern scholarship—books which undertake to "reconcile science and religion?" As well try to "reconcile" the laws of gravitation, of optics, and of life; they all belong to one administration, and there can be no such thing as reconciling things that are, in the nature of the case, in harmony *per se*.

Theology may well cease to grow nervous at each newly-opened door into some secret revealing-chamber of the material universe. Copernicus unveiled the divine orrery, and 16th century ecclesiastics called it arrant heresy. Darwin unlocked his museum of Natural History, and holy hearts were horrified. But, on wings of the Copernican Astronomy and Darwinian Biology, we rise, as John Fiske says, "to higher view of the workings of God and of the nature of man than was ever attainable before." Yes, and was there ever a galaxy of facts so eloquent and so indisputable, to prove the unity of the entire material existence, as the facts which were thrown upon the intellectual canvas by the utterance of Newton's law of gravitation! The most astute astronomer who probes the nightly sky knows full well that he shall never penetrate the wilds of distant space so far as to come upon any wandering globe which is not chained to its place by the ever supreme force of this law! Reconciliation is only required by ignorance. If religion and science seem conflicting, surely along one line or the other more knowledge is needed; when all the secrets are out, the songs of the stars and the psalms of human life will be found to be parts of one sublime oratorio, blending richest harmonies unto the praise of their one Author.

Ingersoll was in error when he hastily judged that Darwin had dethroned Deity. He did but remove our personal God a little further up the heights —builded for him a higher throne. The Darwinian dream involves the most sublime conception of creative skill; the skill which could not only create the universe, but could endow primitive, inorganic matter with such germinal dynamics, that, of its own spontaneous motion, it evolves the vast and complicated mechanism of majestic beauty which the scroll of the heavens and the sportings of microscopic insects unfold.

So far as Theology goes, I do not hesitate to accept a radical theory of evolution. I cannot see that its tendency is Atheistic, but the more I see of it, the loftier grows my conception of the Great, White, Creative, Controlling Throne of God.

The whole question is one of fact. In spite of Darwin and Huxley and other great and well-known names, there remains the obstinate pertinacity of the demarking lines between the species. Theory erases them, but are we sure that nature does? When indisputable facts shall utter their unanimous verdict of approval upon Darwin as they have done upon Newton and Kepler, we will accept his theory verbatim, withersoever it leads us. We have no escape from the testimony of *facts*, and no fear of their trend; they *can only* lead us to the truth, and God is truth! But Science must leave no interrogation marks in its finally authoritative postulate. The ferment which followed the supposed discovery of the artificial production of life from inorganic substance, met inglorious downfall when the gifted and scientifically conscientious Tyndall counter-proved, and demonstrated that without the touch of life, no life can come. It is wise to suspend judgment until theories have had time to crystallize and to receive adequate confirmation.

Evolutionists tell us that man belongs as truly to the family of catarrhine apes as truly as lions and leopards belong to the cat family, and that our ancestry is indistinguishable from rabbits and squirrels; and they say that "there is no more reason for supposing that this will ever be gainsaid than there is for thinking that we shall ever return to faith in the concentric spheres of Dante's heaven." (Fiske.) Very well! I am not here to discuss materialistic evolution—certainly not to deny it.

I wish the rather to lead you along this line, viz: Whatever the facts regarding materialistic evolution, there is, evidently, and very beautifully conspicuous in nature, an *evolution of creative ideas*, which the dullest scholar may perceive, and which, once fully seen, will trace the features of the Creator in more lordly outline and more heavenly colors.

I do not know that I shall succeed in detaching your minds from the evolution of matter sufficiently to make clear the thought which is crowding upon me for utterance, viz: the presence of creative ideas, steadily wrought out in the processes of nature, whether with or without an actual material evolution; but I hope to be able at least to suggest it. When we catch a hint of a new idea—see it glanced upon in one species, advanced into realization in another, and appearing full-orbed and complete in another—it does not matter to us whether the species literally evolves from its predecessor for, better than that, we see the evolution, through successive stages of imperfect embodiment, of a divine creative conception, which is being wrought out before our eyes. In the materialistic evolution we see unity of purpose and authorship in creation; in the evolution of ideas we discover a higher purpose—a more refined and subtle, hence a more exquisite dream of the Creator, than even Darwinism ever gave. We not not only find Him unfolding from the bundle of matter the things that He had previously infolded there, but opening out processional and evolutionary ideas such as transcend the limits of matter, and of which matter is only capable of being a vehicle. It is *not* my thought that the Creative mind was working in the dark, empirically, as if He had created protoplasm and then experimented to see what He could make of it—I speak reverently—but rather that, from His own perfect idea, He projected into space a grand, spectacular evolution, in which, by successive stages, He wrought out His own perfect idea, without shock, and with least possible creative interjection.

I cannot conceive of God as abruptly projecting into space a full-blown universe, shocking even Himself by explosively surrounding His own person with shining globes and glowing suns. I cannot conceive of Him as creating—as the little boy asked his mother if God did—"a three-year-old colt in half an hour." Neither is it like God to fling a full-grown man into the world. I do not say that He did, or did not; but I say it is not like Him. Knowing what we do of Creative methods, we should expect—if we saw man first of all—to uncover somewhere the approaches by which the human idea was gradually attained.

Creation seems to proceed by processes, from simple to complex, from plain to ornate, from lower to higher forms and functions. We do not discover evidence of abruptness in nature. We do not find signs of interference as if a new idea had struck Him and was suddenly embodied, so that there stalked forth from the hitherto tenantless jungle the new and startling impersonation of His new thought. Not that; but it is perfectly evident that the idea was all clear with Him from the beginning, and the spectacular evolution of that idea was made to proceed. It might be by (even) a new creation, of which there seems some evidence in spots, but in every case each lower existence creeps up toward, and deftly suggests the next higher. None can see and comprehend the lower order in its perfect development, without catching a broad hint of what is coming next. Granted that God *could* have seen the whole panorama of human life and its magnificent inventions and acquisitions, and that by His creative fiat He *could* have projected this mature planet and its complicated human society, full-blown as by legerdemain, exploding all into instantaneous entity; but how infinitely inferior, as an instructive lesson, would that have been, compared with the unfolding of processes which actually appear!

How little we should have known of a Creator if we only beheld the finished structure! The working plans are infinitely more inspiring, and the processes are a sublimer revelation.

How marvellously suggestive and instructive, for instance, the nebular theory of the universe, and how absolutely sustained and proven by the nightly tapestry of the heavens. "He spreadeth out the heavens as a curtain," and, traced upon it in divine needle-work, are the stories of world-creation. We see the annular and the spiral nebulae, we see faint nuclei of now-forming suns, we resolve some nebulae into stars. Varied stages of the process appear. Coming to our own system, we find Jupiter, the largest planet, not yet cold; the sun still molten at the planetary center; earth cool and decorated; the lunar satellite, frozen. All stages in the process appear, and they tell us of God's creative idea, and how He worked it out for the spectacle of the universe. Who that has seen La Place's famous experiment, illustrating this thought of Kant and Herschel, needs words to convince him that the nebular hypothesis has passed the bounds of speculative theory? Countless millions of ages of revolving homogeneous ether; uncounted cycles of time, while the solar system cooled and threw off, one by one, the planets; innumerable centuries of cooling, and abrasions, and geologic changes of inorganic matter. Immense periods of flora; long aeons of animal development, and then the advent, by whatsoever gate, of man!

All the way is discoverable the steady outworking of the Creative idea, toward which he wrought with utmost deliberation, and no break. It is as if He would exhibit whatever is beautiful and excellent in Himself, by embodying it in created substance. Not because it was necessary to Him; but because His creative idea was, to begin with the lowest forms of matter, and evolve—*display as an evolution*—the steps back to Himself, the onward march of disclosure upon disclosure, by which the composite photograph of the Divine Creator could be traced in all the complicated outlines.

Glance at the first chapter of Genesis—this poem of creation, composed from the standpoint of a spectator, this exhibition, this panorama of what one would see from an observant posture, on some periphery-point of the earth's surface. It is perfect thus—not chronological in succession of deeds, but strictly so in description of *phenomena*.

We read, "God said let there be light, and light was." Not from the sun; this was before the sun; it was the cosmical light, well known to science, that was diffused as the chemical processes begun. The lifting of the vapors, the parting of the waters, and the creation of the sun and moon! What is this anachronism? The sun created after the continents of earth? Not at all; but the vapors were lifted, so that, for the first time, the observer *saw* the sun shining in its strength. That was of necessity the only possible order as seen by the spectator. All is spectacular. And next, "the stars also." The nebular theory creates the stars long, long ages before, certainly! And so again we see that Moses is not relating scientific chronological annals of official dynamics; but, having discovered the sun and moon—lo! in the clearing atmosphere, in the night sky, he sees "the stars also." Beautiful, unfolding spectacle—the evolution of the decorative idea of the Creator, dawning and beaming upon the observer from out the revealing heavens.

Is not the whole creative and unfolding process like a mighty kinder-garten? Do you ask, who and where were the children, to be learning from this unfoldment? Irrelevant, and not pertinent. The process goes on, and whenever reasonable beings shall evolve in the creative ascent, they will turn the stony leaves, and read in fossil ferns, and stratified gravels, and injected veins, the story of the historic, spectacular evolution of the creative thought. You will note that we are somewhat released from bondage to chronology and to matter as we are tracing the evolution of ideas.

An illustration may serve to more clearly define our thought. One day we see a mounted messenger speeding over the plain with dispatches, and we read them by the light of a whale-oil lamp; it was many years ago; and as we read we reflect upon the creative idea of nature subserving man—the horse obediently flying away on his errand, the whale sacrificed for his light. Wonderful subordination of nature! Wonderful foresight of a beneficent Creator! It is a beautiful presentation of a beautiful idea. The children know not that there is anything better in the cupboard; but when that lesson has been thoroughly spelled out, lo! the locomotive and the trolley-car! Lo! the Morse alphabet and the telephone, the telautograph and the phonograph, and the idea of limitless speed, of annihilated time and space enters in. Where now is the old story of the seventeenth century? Not contradicted, but out-grown! Here we have a new and brilliantly illustrated chapter, but we had to read the dull one first. The idea evolves. Electricity was not evolved from whale-oil, but the brightness of this revelation came out of the dimness of that, and the new was uncovered at the right time to far more profoundly impress upon man the divine idea of the subjection of the riches of nature unto human need.

Let us now get into the line a little deeper, and illustrate the evolution of ideas by the process which Prof. Drummond calls the evolution of the mother. I may be pardoned if I do not perfectly present his thought. I shall come near enough to it for my present purpose.

In the early form of protoplasmic life was the simple cell; it elongated, doubled, parted in two, and that was maternity. Cells divide and subdivide rapidly, one becomes a million, each new organism independent from the instant of its separate existence, and the earlier cell is a mother in the poor sense of predecession, but how far from ideal motherhood! No love is possible between her and her million progeny, scattering as soon as born, and having neither relation or dependence upon her, save in the single matter of succession. The mother idea is but begun. In order to develop motherly traits, there must be a reduction of the number of progeny, so that it may become possible for her to know them individually and to come into such relations as are quite impossible when the number of the offspring is almost infinite. There must also be a longer period of dependence so that there may be time for affection to develop. Now, as we move up the scale of being, we find this actually occurring—this, which we have discovered on *a priori* grounds, would conduce to the end in view. The process is very gradual, but, not to linger at the steps, we will take, in our thought, an immense stride upward, and come at once to the mother of a basket of kittens, three or four, with weeks of dependence both before and after birth, of proximity and close relationship. The result? Motherliness, now far advanced. Love has been born; it *had* to come, as a result of this well designed process of reduction and extension. And on the glittering apex of life we find the human mother, with *one* child, long and intimately and utterly dependent upon her for life and sustenance, and through a phenomenally prolonged infancy, the single object of matchless, maternal solicitude. By such processes the divine idea of motherhood is evolved, and what an evolution! As Coleridge says:

> "A mother is a mother still,
> The holiest thing alive."

And the old proverb puts it chastely, "Because God could not be everywhere, He made mothers." And what is a mother, but the rare embodiment of one of the sweet sides of God Himself! The reproduction of the tenderness of God.

In like manner we might exhibit the evolution of the father, and of fatherhood, reflecting, as in a dim mirror, the unfathomable fatherhood of God.

All these and many that we might mention, combine to suggest and explicitly to exhibit, by evolutionary steps, the Creator's idea of affectionate family life, of fatherhood and brotherhood—one great broadside of traits that are perfect in himself, and have been thus steadily approached by easy stages in the unfolding panorama of the planet and its people.

Let us now revert to things more abstract, yet even more simple. Take, for instance, the idea of floral beauty. God must be an eternal lover of the beautiful, for he has made so much that is beautiful. There is, therefore, a divine idea of it, and we start to find it. Here it is: A little, modest blossom, the "innocence" of the spring meadow; four lavender leaves on a slender stem; scentless, short-lived, a weak thing, but it is a flower, and is beautiful. We have the idea, we think. But afterward we find a field daisy, and at once we are alert, for we have now discovered progress in the idea of beauty, and there may be other steps. Yes, an aster; a pink—from single to double, from scentless to fragrant. One day I come to Washington, and here behold the exquisite beauty, the rare glory and sweetness of the famous La France rose; its blushing petals have the delicacy of velvet, in artistic involutions that even a woman's fingers could not replace when once unfolded, tinted with fading sunse thues and blessed with sweeter fragrance than rare alembic ever yielded to ancient alchemist. So I have caught the idea of floral beauty unfolded by the Creator through successive steps, until the idea in its fullness is mine, and I conclude that eternal beauty, of which this is the luminous outline, fully exists within himself. Thus I learn something of the "beauty of the Lord our God."

Some day He would teach me sublimity, and His own divine majesty. He leads me from the plain, out upon the rolling prairie; points to the outcropping ledges, and mountain uplift, to dark ravines, and snowy peaks in glistening sunlight. One day He leads me across the land to Puget Sound, and lifts the curtain of the mists that veil the lordly Mount Tacoma, ermine-vestured, sun-painted, majestic, matchless, of translucent opal, invested from sea to summit with supernal glory, like His own transfigured throne—and I have my lesson. Volumes, treatises, words are nothing any more; I have *seen* the sublime; I have caught the divine creative idea, and have implicitly followed the evolutionary process. This is the beatific vision of sublime Creatorship.

I have taken these illustrations quite at random, but the Creator's plan is orderly and progressive. Some things are taught by one grade of existence, others by another, and the climax of one class becomes the suggestion for the next above. The culmination of this order conveys a germinal hint what will be the chief characteristics of another. As we rounded Diamond Head, that weird, burned-out volcano which guards the gate of Honolulu harbor in Hawaii, we saw ever and again some gleaming flash of light springing from the water, gliding a few rods in air, and dipping again beneath the ripples. One of these silver dreams fell upon our deck and we caught it. A bird? O no! it was a fish, a flying fish. It had no wings, and no likeness to a bird save in this rude hint of flight. But the eye caught the movement, embryonic as it was, and when we see the eagle circling cracefully in mid-heaven, we remember this and say, Here is the realization of that low hint. So the child learns his object-lesson and the kinder-garten proceeds.

In all these cases it seems as if the climax of the lower does but suggest the higher, and then ceases to develop further, having done its work in germinating the idea. It seems as if the ape came near enough to suggest man by his uprightness and movements, but with all his agility can never leap the chasm into manhood. It seems as if the instinct of the dog comes near enough to suggest reason, but never becomes reason. It seems as if amiability and refinement and culture come near enough to suggest spiritual life, but can never, alone, become divine. These things *seem* so.

Each lower grade leads up almost to the next, lifts to its own utmost reach the idea committed unto it, which is then taken by the next order above and still further advanced toward perfection. The evolution of the idea proceeds both along and across demarkation lines, from species to species and from order to order, until at last, almost divine, the hand of the Creator touches its crowning output with spirit life, adds the last link, and the cycle is complete.

The evolution which started with the lowest chaotic ether—the most primitive creation possible—has moved on, through inorganic and through organic matter, through varied forms and degrees of life and thought, unfolding little by little the creative idea, which reached at last in man the virtues, capacities and attributes of the Creator himself, and thus slowly crept back and up the long stairway toward the Throne of God, whence it started. Human mind, human mastery of matter, human virtue steadily approaching its original, never resting and never to rest until it has actually reached once more the Eternal. The climax appears in the ultimate elevation of humanity into the likeness of Deity.

This last product, a noble human soul, aspires to no unconscious Nirvana, no impersonal absorption, no rebellious rivalry; but simply, as the final act of the wondrous drama, is itself by the magic touch of the Spirit perfected, presented as the crown and consummation of the entire evolutionary process, and seated beside the all-governing Creator in fit companionship.

Materialism to the background! We have something better. This is evolution, theistic, optimistic, inspiring. The creative idea is now fully unfolded; the long, dependent chain which was hung down from the throne "in the beginning," receives its last golden link in the gift of godlike immortality, and the loop is welded to the Throne at both ends. First, God sat alone; last, shall man sit with Him, and be "like Him."

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Evolution
and
Theology

Andover Review
Dec. 85.

EVOLUTION AND THEOLOGY.

Two recent events have awakened a new public interest in the discussion of the relation between evolution and Christian theology. Professor James Woodrow of Columbia (S. C.) Theological Seminary (Presbyterian) had been deposed from his chair by a summary process without trial, according to the very doubtful precedent set in Scotland in the case of Robertson Smith; this action has been condemned by the action of Synod, and certain of the trustees who voted him so summarily out of office have themselves resigned. Whether Dr. Woodrow will resume his chair is, at this writing, uncertain, as is also the interpretation to be given to the action of the Synod. This appears from the reports to be less an approval of Professor Woodrow's position than a disapproval of unpresbyterian methods of putting him out of office. Professor Woodrow is a Christian, not merely a theistic evolutionist. He holds to the doctrine that animal man is a development from a lower order of creation, but that spiritual life was imparted to him from above, not evolved from below. He also insists that he holds to the Westminster Confession of Faith, so that it must be assumed that he believes in a historical fall, and disbelieves in Mr. Henry Ward Beecher's now famous saying that the only fall was "a fall upwards." The other event is the publication of Mr. Beecher's "Sermons on Evolution." These sermons were preached to crowded congregations, and the interest in them was so great that they were sent verbatim by telegraph to a Chicago paper, and somewhat less fully for publication in a Boston paper, — a tribute not paid, so far as my recollection goes, to any previous course of Sabbath discourses. These sermons are now brought together and published in book form by Fords, Howard & Hulbert. Mr. Beecher is far more successful in applying truth than in unfolding it; in showing its practical aspects in its bearing on life than in formulating it in a system. He is, indeed, more systematic than most critics imagine him to be, but this system is rarely prominent in his own mind, and is never prominent in his discourses. These sermons are no exception to this general rule. They are sermons, not theological essays preceded by a text; and their aim is not so much to prove evolution, or to show the bearing of evolution on theology, as to use what may perhaps be termed an evolutionary theology in practical pulpit work. How far he succeeds in this attempt I do not propose here to consider. I only note the existence of these sermons and the action of the South Carolina Synod as indications of the interest of the public in the general subject. For those who are least inclined to regard Mr. Beecher as a safe leader do not doubt that he possesses in an eminent degree the faculty of perceiving by a sort of sympathetic intuition what are the subjects about which men are thinking and on which they want light.

I do not propose in this paper to criticise the position of either Mr. Beecher or Professor Woodrow, nor to attempt to determine the true relations between scientific evolution and Christian theology, but only to indicate certain thoughts, or directions of thought, which the pulpit must emphasize, and which, if adequately emphasized by the pulpit, will guard perplexed minds from the dangers to their faith threatened by evolutionary theories.

The difference between natural science and theology is a difference in field and in instruments of acquisition. The scientist has external nature for his field and observation for his instrument of acquisition; the theologian has the human mind for his field and consciousness for the instrument of his observation. If it be said that revelation constitutes either his field or his instrument, the reply will be: This is true; but revelation is made to human minds by experiences wrought in human minds. Thus revelation simply enlarges the field and the instrument; it does not add a different field or a different instrument. Now the scientist tells us, and tells us truly, that the theologian is bound to accept the facts ascertained by scientific investigation. "You may preach," he says in effect, "what theological theories you please, and we shall not quarrel with you so long as you do not deny or ignore the facts of the universe; but if you preach an interpretation of the first chapter of Genesis which makes the world to have been created in a week, your preaching will come to naught, because we have ascertained as a matter of fact that the processes of creation occupied millions of years. So, if you preach a chronology that allows man to have lived on the earth only six, or eight, or ten thousand years your preaching will be in vain, because indisputable evidence makes it clear that the antiquity of man is much greater." It is certainly true that no theology can survive which denies or ignores well-established facts; but it is equally true that no scientific theories can survive which deny or ignore well-ascertained facts. And there are certain facts, interpreted, indeed, by the Bible, but wrought into human consciousness, which the scientist must recognize, or his scientific theories will come to naught.

Three of these facts seem to be inconsistent with certain forms of the evolutionary hypothesis; if they are so, it is certain that the evolutionary hypothesis will have to conform to human consciousness, not human consciousness to the evolutionary hypothesis.

1. That we are the children of God is a fact declared indeed by revelation, but one for the knowledge of which we are by no means dependent upon revelation. When Paul declared to the Athenians, "We are the offspring of God," he made his declaration not to Jews, nor to Greeks, but to pagans; and he cited in support of it neither Old Testament writings nor New Testament writings, but a pagan poet. In a word, he appealed to the universal consciousness. And it is to be observed that this declaration is more than a declaration of the fatherhood of God. That might mean simply that God has adopted us, that He vouchsafes to us a protection and a guardianship like that vouchsafed by a father to his child. But this declaration is explicit, that we are descended from God, he is our progenitor, we are partakers of the divine nature, we belong to God and He belongs to us. The fatherhood of God is not a figure; it is the fatherhood of man that is a figure, and the fatherhood of God the eternal reality. We are his, not by adoption, but by procreation. Moreover, this is a race idea. It is not individuals here and there, it is not the Jewish nation or the Christian peoples who are the offspring of God; of him the whole family in heaven and earth is named. This is the root idea in the Mosaic account of the creation of man. God formed man, Moses tell us, out of the dust of the earth, and breathed into him his own life. By what process he made the physical tabernacle, that it might contain the divine image, Moses does not tell us, and probably did not know. It is not necessary for us to accept the theology of the negro preacher and suppose that God shaped a man of clay and leaned him up against the fence to dry. The material man, the man whom we observe, the man about whom science knows, was evolved from some lower elements. How long the evolution took, and what was the method of it, is a question for science, not for theology. It is one on which revelation is silent. But however this evolution was wrought, and however long time it took, when it was completed the divine spirit was imparted. The physical and animal in man comes up from below; but there is also a divine in man which descends from above, which was not and could not be evolved.

Now the evidence of this is not in the first chapters of Genesis nor in the seventh chapter of Romans. It is in man himself.

The first chapter of Genesis and the seventh chapter of Romans simply interpret the dormant consciousness of divinity. The human soul answers to the appeal of its father. As one string vibrates to the sound of another, so the spirit of man to the spirit of God. We are in accord; or, if not, if there is a dissonance, the pain of the discord no less than the beauty of the harmony illustrates the true nature of the spirit in man. Evolution may explain as it will the process by which the observed man, the material and animal man, were developed from lower forms, — and there is much in comparative anatomy and physiology and in the science of embryology to support its explanation, — but if it denies or ignores the divinity that is within us, which reaches out toward and answers to the divine without us, it will come to naught, because it will contradict the invincible testimony of human consciousness. And I venture to suggest that the minister who does the most to awaken this divine consciousness in the souls of men, and who leaves severely alone doubtful interpretations of the first chapters of Genesis and doubtful discussions of scientific theories about which he cannot know very much, will do the most to strengthen the faith of his people against whatever irreligious tendency there may be in the evolutionary hypothesis in its extremest forms.

2. No less certain is it that mankind has sinned and come short of the glory of God. It is difficult to write on this subject without a certain appearance of cant, because cant has vitiated even the language, as it vitiates everything it touches with its polluting breath. But it is certain that guilt and imperfection are not synonymous. We often, it is true, punish as guilt what is only imperfection, and overlook as imperfection what is guilt. This is due to a defect in perception, not to an inherent and generic resemblance between the two. The babe is imperfect and must grow to manhood; but the babe who has scarlet fever must be cured of a positive disease. The child who stammers and stutters over his alphabet must grow wiser; but the child who willfully declares, "I will not say my alphabet," requires something else than growth to set it right. Immaturity is not sin; animalism is not sin; the predominance of an animal nature is not sin. Gluttony is not guilt in a hog; the more he eats the better hog he is. Fierceness of passion is not crime in a bull-dog; the better the breed the fiercer the brute. Sin is always a fall; when we sin we go down from a higher to a lower life. The first chapter of Genesis is undoubtedly a poem, and there is much to indicate that the

second and third are also poems. The talking serpent, and the tree, and the garden, and the exclusion of the man and the woman from it, in any other book would impress the average reader as belonging to the literature of allegory. But whether it be a poem or not, it is certain that every man has written for himself a third chapter of Genesis which is a most prosaic and a most mournful fact. Every broken resolve, every high purpose lowered, every sacrifice of reverence to sensual desire, of conscience to passion, of love to greed or ambition or wealth, is a fall. The story of every individual, the story of the race, is a story of successive falls and restorations. For sin and fall are race facts; the men who have gone down from their higher to their lower nature, who have violated their better and nobler impulses, who have disobeyed the law written within them, are not the exceptions. I once conducted prayers in an inebriate asylum and read without comment the seventh chapter of Romans. Three or four of the men came to me after service to ask for the place of my reading; they wished to re-read it. "It describes," said they, "exactly our condition." This is the true story of the fall, and it is a transcript of every human experience. Nor is it confined to individuals. Modern Greece has fallen far below the Greece of Phidias, of Solon, and of Plato; the Italy of to-day is many degrees below the Italy of the Roman republic. He who will compare the moral utterances of a Jefferson and a Madison with those of the pro-slavery political leaders who carried the Southern States into the war for secession will hardly doubt that the South fell a long way in half a century. This experience of sin and fall is a fact, not a theory. Science may, indeed, say it is not a physical fact and we have nothing to do with it; but any hypothesis which it proposes for the explanation of the mystery of life must take account of this fact. If it denies or ignores sin and fall, it denies or ignores the most patent fact in history, national and individual; and any philosophy of life which leaves this out of account will, and ought to, come to naught. I beg leave to still farther suggest that that preacher who emphasizes the fact of sin and fall, who succeeds in awakening in the consciences of his hearers a personal sense of their own sin and fall, and who leaves severely alone doubtful interpretations of the third chapter of Genesis and doubtful discussions respecting the origin of the race, will be most successful in counteracting whatever danger there may be of intellectual pride and self-satisfaction in the evolutionary hypothesis in its extremest forms.

3. The third fact made clear by revelation, but tested and confirmed by science, is that of redemption. As sin and crudeness are different, so are redemption and growth. Development will cure crudeness; but only redemption will cure sin. Sunshine and time will make the twig and tree; but sunshine and time will not take the worm from its root nor the borer from its heart. Development will make of an imperfect animal a splendid animal; but development will never change the animal into the spiritual, the dead into the living. This must be done by the play of a higher nature on the lower, by a coming down in order to lift up. The child may outgrow many of its immaturities and crudities; but it can be redeemed from its deliberate wrong-doings only by the power and the personality of a higher and better nature, — the father's, the mother's, the teacher's. The nation may grow from a colony to a commonwealth; but if slavery has fastened upon it, slavery will grow with its growth and strengthen with its strength, and nothing will suffice to redeem the nation from its guilt and curse except a strong and noble nature, full of divine truth and love, appealing to the sense of justice and humanity in its citizens, — in other words, to the divine sleeping in the heart of the nation. Material forces may give it growth; only immaterial forces can bring it redemption. A Vanderbilt with his railroad, and a McCormick with his reaper, may enlarge its resources and its boundaries; but only a Garrison or a Phillips can emancipate it from its bondage. As with the child and the nation, so with the race. The question at issue to-day between the two schools of philosophy is not primarily whether the development of the race from low-down beginnings has been carried on under the supervision of God or without his supervision, — it is far more fundamental: it is the question whether there is any divine power bending down from the heavens to lift up into heaven a race into which the breath of a divine life has been breathed, but which has poisoned itself by a vitiated atmosphere, and is well-nigh dead from spiritual asphyxia. No soul, and so no aggregation of souls, can climb up to God; He stoops down and lifts us up to himself. And so I venture finally to suggest that that preacher who lives nearest to God, whose fellowship is with the Father and with his Son Jesus Christ, and who thus brings to his people not a theory about God, but the living God in his own Person, and who leaves severely alone doubtful disputations about theories of atonement and expiation, will do most to guard the faith of his people from the dangers which are threatened by an evolutionary hypothesis

which in its extremest forms denies the guilt of man and both the need and the possibility of the redemption to man. For if there has been wrought into the soul a personal sense of divine sonship, a consciousness of sin in falling away from it, and a hope of restoration to it through God's love coming down from above and bringing new life, no scientific theories of either man's origin or man's development will impair this spiritual life or prevail against it.

Lyman Abbott.

CORNWALL-ON-HUDSON, NEW YORK.

EDITORIAL.

PROGRESSIVE ORTHODOXY.

VIII. CONCLUSION. CHRISTIANITY ABSOLUTE AND UNIVERSAL.

THE series of theological articles which is now completed has been a discussion of the principal doctrines of the gospel, in order to recognize some of the lines along which advancing Christian thought has more recently been moving. We have considered the Incarnation, the Atonement, Eschatology, the Work of the Holy Spirit, the Christian, and the Bible, to discover in what respects clear and positive improvement has been made on statements of belief which once had general currency. We have not pretended to create a theology, but only to modify or to enlarge established doctrines. When we have used the term New Theology it has been only as a convenient designation of a fresh movement in theological thought, only as the symbol of a quickening which we share in common with many others. In the exact use of terms there can, of course, at this late day, be no such thing as a new theology. We are not so silly as to suppose that modern religious thought is independent of an ancestry. Sturdy growth has old roots. The truth we study has engaged earnest thought throughout the Christian centuries. We have only attempted to show the directions in which generally accepted principles are pushing on to new and larger applications, and to learn also, by means of applications which can scarcely be ignored, the real significance of those principles which are, and always have been, potential of such results. Now that we can look back over the course which has been traveled, it is easier to perceive the kind and degree of progress achieved than when we were engaged on the separate topics.

A single principle has for the most part guided the development of thought in the series, and this because it is the principle which is dominating more and more regally the intelligent Christian thought of our time; a principle which will no longer be confined within limits too narrow to contain it, nor tolerate the company of theories inconsistent with the truth it expresses. Readers cannot fail to have observed the emphasis we have laid on the universality of the gospel. We have assumed Christianity to be the final and supreme revelation of God to man, a revelation intended for the whole human race and destined to supersede all other religions; and all the way along our inquiry has been concerning the reality of this principle. What is involved in it? How far does it carry us? What value and power reside in the religious knowledge men gain apart from the gospel? How is this universal gospel related to those large numbers of the human family who are entirely ignorant of it, and to the generations that have passed away without knowledge of it? We have been very far from affirming that the universality of the

Evolution

	the poles to the equator, and it teaches of like environments in high and low latitudes, of which one of the most important is light. Such conditions require an axis nearly perpendicular. (The reader will please not to consider this even an attempt to discuss this period. Nothing can be done within the necessary limits of this paper.)
21. And God created great whales, and every moving creature which the waters brought forth abundantly, and every winged fowl after its kind.	After the glacial epoch and, *à fortiori*, after the Pliocene, present water vertebrates appeared for the first time, and present fowl.
And God saw it was good.	No further advance has been made in the genera, and scarcely any in the species.
25. And God made the cattle, beasts, and everything that creepeth on the earth.	In most recent times and after the last-named animals, the living mammals of to-day appeared.
And God saw that it was good.	This was final. No new mammals have been added. It ended the long preparation for man.
27. And God made man (Adam in the Hebrew) in his own image.	Perhaps there were other races earlier, but the race of Adam, the progenitor of the people about whom the Bible is mainly written, came into being at this end of the creation work.

It has been said that no philosophical divisions of the "creation" into six periods can be made. The following, which is merely the Mosaic division, seems to meet the requirements.

1. The nebulous or embryonic stage, ending in an opaque earth, with days and nights.
2. The pluvial stage, ending in a world covered with water.
3. The preparatory stage, reaching from somewhere in the Archæan to the latter part of the Tertiary, including continental development and the finishing of vegetation.
4. The fourth stage, in which the sun and moon become time measures, unequal days and nights and seasons were introduced.
5. The fifth stage is the final stage in the development of water creatures and birds.
6. The sixth stage includes the production of living mammals.

The most remarkable things about the account are its freedom from monstrosities, the agreement of its order with that of the world's history, and the manner in which it meets the requirements of what a revelation should be, as they are set forth by Dr. Draper.

"Considering the asserted origin of this book,[1] indirectly from God Himself, we might justly expect that it would bear to be tried by any standard that man can apply, and vindicate its truth and excellence in the ordeal of human criticism. . . . As years pass on, and human science becomes more exact, more comprehensive, its conclusions must be found in unison therewith. When occasion arises, it should furnish us at least the foreshadowing of the great truths discovered by astronomy and geology, not offering for them the wild fictions of earlier ages, the inventions of the infancy of man."—*Dr. Draper in The Intellectual Development of Europe.*

Thus much for the positive side, now for the negative.

Genesis does not say that world was made 6,000 years ago.

It does not say that anything was done on any one of the "days."

It does not speak of the first plants or water animals, or birds, nor of the first land animals.

It does not say how they were made.

It does not say that the earth is the largest body in the universe.

It does not say that it is larger than the sun.

It does not say that the stars are less than the sun or moon.

It does not say that all plant life began at one day—nor does it say that of either aquatic or land animals, or of birds.

DR. WARRING then read a paper on

MIRACLE, LAW, AND EVOLUTION.

I. *Miracles and Law.*

I do not propose to discuss the reality of the miracles recorded in the Bible. Those who deny their possibility, as well as many who believe in them, look upon miracles as generically different from those occurrences which are said to take place in obedience to the laws of nature. There certainly is a difference. I propose to inquire what it is. Evidently it is not in the degree of power required; for raising the dead is a less thing than the birth and growth of an individual. It is less to set in motion a watch that has stopped, than to make one. Causing the widow's oil and meal to increase was a small matter in comparison with providing daily food for the millions that cover the earth.

Nor are miracles intrinsically more wonderful than those things which we regard as the effect of law. Nothing is more common, or less excites our surprise than the working of the law of gravitation; yet, what is more wonderful than a force which, according to Laplace, travels more than fifty million times faster than light, itself moving with the inconceivable velocity of nearly two hundred thousand miles in a second?

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[1] Dr. Draper is speaking of the Koran, but his words are better than he knew.

Were to-night, in some far distant constellation, another sun called into existence, ages would pass before its light could reach our earth, but only a few seconds would elapse before the earth would feel its presence.

Nor is this velocity the only or the greatest cause for wonder. Another property of this force far surpasses that. I mean its ability to adjust itself with omniscient accuracy to every change in mass, or position, of bodies however widely separated.

The adjustment of position and movement of every member of our solar system, and, I may add, of the universe, to the mass, distance, and position of that new sun would at once begin and, in due time, complete itself with an exactness that is perfect, and which no human measurements can hope to equal. And since every atom is attracted by every other atom in the universe, it is a sober fact that the fall of a sparrow is registered in every star fifty millions of times sooner than light can speēd its way across the abyss that separates them. Can any miracle be more wonderful than that?

We may extend the comparison as far as we please, and we shall find in all cases that miracles differ from what we regard as the effect of law, neither in the amount of power required nor in their intrinsic wonderfulness.

We must, therefore, seek for some other characteristic by which they may be distinguished. So far as I can see, this lies in the continuity of the one, and the absence of continuity of the other. In a world where no vegetation had ever existed, the production of an oak would be a miracle. To us it is merely the outworking of law, because it goes on continuously. The first plants and the first animals came into existence by a miracle. They continue to come into being, and now it is law. In every law the first of the series was a miracle, and, had we been present, would have excited our profound wonder. But often repeated, it ceases to excite surprise, yet the thing itself is unchanged.

The dead rising, the deaf hearing, the blind seeing, when commanded by Christ or in His name, were miraculous occurrences. But if this had continued, if every time a dead man was told in that name to rise, or a deaf man to hear, or a blind man to see, he had obeyed, no more surprise or wonder would be excited than now that men wake from sleep. It would be simply the way in which nature works.

So far, then, as I can see, the peculiarity of miracles lies in their uniqueness. Each stands by itself. A miracle may be represented by a point; law by a line; successive points make a line. Miracles indefinitely repeated crystallize into law. In briefest phrase, law is continuous miracle. Those, therefore, err who rank miracles as higher or more divine than law; for as two are more than one, and four more than three, and a series greater than any one of its terms, so law is greater and intrinsically more wonderful than miracle. Neither admits of explanation other than the will of that First Cause which lies back of all.

II. *Miracles and Evolution.*

What, it may be asked, have these to do with each other? Are they not catch-words that represent the opposite poles of modern thought? I ask your patience and attention, and, when I have done, I hope it may be clear that they do have something to do with each other, and that, if they represent opposite poles of thought, they help to weld fragmentary truths into one consistent whole.

Christ is represented not only as a worker of miracles, but as the Creator, the informing spirit that produced all things which exist, or ever did exist.

Those who believe this, and that includes all who regard the New Testament as inspired, will, I think, agree with me when I say we may reasonably expect to obtain from the study of His methods, when performing His miracles, some light as to His course when acting in His capacity of creator. Just as when we find certain peculiarities of style or diction in one of an author's books, we expect to find them to some extent, at least, in all his works; so, if we find some peculiarity, some way of doing things that runs through all His miracles, it would be reasonable to look for it in His mode of doing His creative work. And I think we are safe in saying that of two theories as to how certain things were done, *e. g.*, how present animals came into the world, that which harmonizes best with His methods when working His miracles would be the most likely to be true.

A brief study of the accounts which we have, will suffice to show that, in Christ's miracles, natural means, laws, and powers go just as far as is possible for them, and then the supernatural comes in and does what they cannot do. When, for example, at the marriage in Cana, Christ would supply the lack of wine, there was the water, the jars, the servants, all in the usual way. He bade the servants fill the jars with water. They did that, and it was as far as natural means could go; then came in His power and added the components needed to make the water wine. This done, the supernatural ceased, the natural again came into operation, for it was the servants that drew out the wine and bore it to the governor of the feast.

Would He feed the hungry thousands? He commanded them to sit down, took the bread and fishes, broke them, and gave to the disciples to distribute. Thus far all was in accordance with law, and it was as far as law could go. At that moment, the divine power came in and did the one thing impossible for nature: it caused the bread and fishes to multiply.

Even here he kept as close to the natural method as was possible. Would we have an increase in our stock of food, we take wheat, and it produces its own kind, or barley, and it produces barley. In all cases by natural law, we take a portion of that of which we would have more, and it multiplies. So here. He would have more bread, he took that, and it produced its own kind. He would have more of the fishes, and the animal fabric grew under his hands, and from what he had, came more of the same kind. It was like producing like, in a strange, abnormal way, it is true, but no more inexplicable, in the last analysis, than is now what we call the natural process by which we get our food.

After the increase of the loaves and fishes, there was no further need of miracle, all else proceeded in the usual way. The multitude ate and were refreshed in the ordinary manner, and the disciples gathered up the fragments.

Would He supply tribute money for His disciples? He told them what they could have learned from no power in nature, viz., where to throw the line to catch the fish which had seized the glittering coin, as it sank in the water of the lake. Up to a certain point, all was natural, the hungry fish voraciously seizing the sinking coin, the line, the fisherman; the one thing needed to complete the transaction, the omniscience which notes the fall of a sparrow, was supplied by Christ. The disciples did the rest. They took the money and paid the tribute.

When He raised the dead child, He brought back life and health, but He commanded those present to give her food. She got life from Him, but strength she was to get in the ordinary way.

When He restored Lazarus to his sisters, he bade the Jews standing around roll the stone away from the tomb. Then they reached their limit. At this instant of absolute helplessness, when nature and man could do nothing, He interposed and gave life to the dead body, but it was the living Lazarus himself that walked out of the sepulchre, and it was those standing by who loosed him from the grave clothes. Christ's exercise of miraculous power, here also, was confined to the one thing law could not do, the restoration of life.

All the other miracles, so far as we can judge from the very brief record, are marked by the same characteristic.

Hence, I think, we may conclude that the divine method in miracle-working was to do only that which Nature, with her laws and powers, could not do, and then to let her do the rest. What was already in existence was invariably used, as far as it could be applied, and to this was added only that which was necessary to complete the transaction.

Hence it seems reasonable to infer that, in His work as Creator, He used whatever was nearest to His purpose, and exerted power above Nature only to do what she could not. As to the rest, He left it to the outworking of natural causes.

Now for the application.

The world of to-day contains many thousand species of plants and animals. There is indisputable evidence that the present is only the last of a long series of "populations," each differing from its immediate predecessor. Each antecedent population was of a lower grade than its successor, until at last we reach the dawn of life where only the lowest orders are found. Or, conversely, starting at the beginning of life, there were for millions of years radiates, articulates, and mollusks, but no vertebrates; then for other millions, there were water vertebrates, but none on the land; then for thousands of centuries, land vertebrates but no mammals, and for another long period, mammals, but none of existing kinds, and lastly those now living.

One example will suffice, although it reaches back but a little way, yet far enough for my present purpose.

Many thousand years ago, there lived an animal which geologists have named Orohippus, or the Mountain Horse. It was about the size of a very small Shetland pony, which in many respects it resembled. Still it was not a horse, for it had four little hoofs on each fore foot, and three on each of its hind ones. The genus lived many thousand years, each generation like its predecessor; but at last "from some cause unknown to science," a new animal, in fact a new genus, appeared, different in some respects from the Orohippus, and approximating somewhat more to the present horse, yet not a horse, for on each of its feet were three hoofs. The Mesohippus, for so geologists have named it, also kept on for many generations, producing at every birth only its own likeness. After a uniform course, for we know not how many thousands of years, there appeared another creature, the Miohippus, very much like its predecessor, but approaching more nearly to the horse. The middle hoof was larger, indicating a promise of an animal in which the two side hoofs should disappear. The Miohippus lived from generation to generation its uneventful life, one monotonous series of like producing like, till at last another animal made its appearance still in the same line of progress; the side hoofs remained, but of diminished size, while the teeth became more like those of the horse.

This genus (Protohippus) ran its course, and then another (Pliohippus) came into existence with greater resemblance to the horse, for it had single hoofs, and teeth still more equine.

Next and last came the horse, the living servant of man.

It is not possible as yet to trace the pedigree of any other animal as satisfactorily as this; there is, however, sufficient evidence to induce the belief that there has been a similar process in all species.

The question is how to explain these facts. Scarce any one doubts that the first life came direct from the Creator. It is in regard to the successive populations that biologists differ. The fact of there having been such. is beyond dispute. It is as to the manner of the successive genera coming into existence that there is question. Only two suppositions are conceivable. Either each species was made *de novo* by the Almighty, or it was born of some preceding creature of a different species. The former is the older theory, and claims to be in exclusive harmony with sacred writ. It teaches that God made, *e. g.*, the Mountain Horse, Orohippus, from earth, air, and water, and gave it life; that later, from more of the same raw materials, he made the Mesohippus; and yet later from more earth, air, and water, he made the Miohippus, and endowed it with life; that, after another long interval, once more from more earth, air, and water, God made the Protohippus, and so on down to the present horse. There was a succession of creations, but no genetic relation between them. This theory was devised when nothing was known of the life history of our globe, and when the plants and animals of Genesis were thought to be the first and only ones that ever existed.

The other theory also holds to the belief in a Creator. It, however, teaches that only the first kinds of plants and animals were made direct from inorganic material. It admits of special creation sufficiently to account for the first links in the chain of life, but claims that, from these, others of new and different kinds were produced at some subsequent time, and from them others, and so on down through many stages to the present. It holds that the law of like producing like was then as now the law, till time and environments were ready, perhaps after thousands of generations, and that then "some cause unknown to science," an agnostic euphemism for a more or less direct act of the Creator, so changed the factors in what may be called the personal formula of the embryos,[1] that they grew up into animals of species till then unknown. Thus, for example, "some cause unknown to science" so changed the embryo in an Orohippus, that it was born a Mesohippus; and, after many thousand generations of the new species, like begetting like for all that time, the "cause unknown to science" so changed the embryo a second time that from the Mesohippus was born a Miohippus, as if now from a panther a lion should be born, and thus the process went on.

The first of these theories, the creation *de novo* for each new species, is as unlike the course of Christ in His miracles as possible. He employed what was already in existence and nearest to His purpose, and put forth the least possible amount of divine, or extra-natural, power that would suffice to adapt the same to his design. The production of new species by changes in preceding forms nearest related, appears to be in perfect harmony with His method.

Such derivation of new species from older species is the essence of evolution, and this whether the evolution was by imperceptible degrees as taught by Mr. Darwin, or at once, per *saltum*, a bound, as it were, at one birth, or at most, in a few successive births, from the old to the new. Such abrupt changes seem most in harmony with the teachings of the miracles. In these the thing to be done was done not imperceptibly, but at once.

So far as I can read the record of geology, its evidence also is in favor of abrupt changes. The links in the pedigree of the horse are well defined; there is not an imperceptible, long-continued transition from genus to genus. There was the Orohippus, and, after a time, suddenly the Mesohippus appears; again, there was generation after generation of the Mesohippus, and then, all at once, is found the Pliohippus, and so on.

In spite of an original and very strong bias the other way, biologists now admit the occurrence of sudden starts upward, jumps in the progress of development. Prof. Huxley, in his "Lay Sermons," page 297, says: "We believe that nature does make jumps now and then." May we not ask: Is there conclusive proof she ever does otherwise? He adds: "Mr. Darwin embarrassed himself with the aphorism which turns up so often in his pages, 'Natura non facit saltum.'"

Prof. Cope, "Origin of the Fittest," page 123, unwittingly illustrates the unwillingness of the biologist to give up the gradualism of Darwin, and the conclusiveness the other way of the geological record. He says: "The results of such successional (embryonic) metamorphoses are expressed in geological history by more or less abrupt transitions, rather than by uniformly gradual successions." It is difficult to avoid the belief that, but for theoretical reasons, biologists, in reference to new species, would almost adopt the motto, Natura semper facit saltum. Be this as it may, evolution gives us no aid in accounting for the changes. The survival of the fittest, however important in determining what varieties shall survive, gives no assistance in determining how and why the variations occurred. As Prof. Huxley well says: "What the hypothesis of evolution wants is a good theory of variation." At present it can be attributed to nothing more definite than "some cause unknown to science." Miracles are equally well explained in the same way.

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[1] "The transition from type to type was done during fœtal life." Cope, *Origin of the Fittest*, page 276.

The believer in the Bible will ask: "But does not this conflict with the story of creation in Genesis? If Genesis be true, is it possible that present species of animals are descended from older species, and back through many steps to the first stages of life upon our globe?" But wherein is the contradiction? Genesis says only that God made, or created, the various creatures named. As to how He did it, there is absolute silence, hence, as to the mode of bringing into existence, contradiction is impossible.

The chief interest most persons have in evolution pertains to man's origin. As to his higher part, the soul, few will be found to deny that it came direct from God.

The doubt is as to his body. Did God form it directly from the ground and atmosphere, moulding the mixture to his purpose, and then give it life? Or did He take, in embryo, or after birth, some animal nearest to his design, and enlarge its form, shorten the length of its arms, change its hand-like feet till fitted for man's upright position, and enlarge the capacity of the skull to fit it for the large brain which was to be the facile instrument of the soul, the go-between of the soul and the body? Whichever really was the mode of man's creation, there can be, I think, no doubt that the latter is most in harmony with Christ's methods when exercising His power in the miracles. And as for the question of dignity, surely matter which under the divine hand had been prepared and refined in all the infinitely delicate machinery of a living body, though that of a brute, was, to say the least, as worthy of man as that which had never since its creation received the divine touch, but had lain, raw and crude, beneath the feet of man's predecessors.

Then there is the creation of Eve. God undoubtedly might have made her as he did Adam. But in accordance with the law that runs through the miracles, it would seem probable that

God took material nearest fitted for His purpose, and in harmony with a method found all through nature, propagation by fission, caused from a part of the man a woman to grow. It seems to me that this was closer to nature's methods still in operation—like producing like—than such changes in another simian, as occurred when one changed to a human being, and became in the sense which we all understand, but shall never comprehend, a living soul.

It will seem strange to many that the study of the miracles of the Bible has led to the support of evolution, so strange, that I fear it may hinder their giving due weight to the argument. But, although some advocates of evolution may appear to desire to use this theory to shut the Creator out of His own world, it seems to me that species produced by modification of previous species show His hand as unmistakably, nay, I would say, show it more clearly than if moulded direct from earth, air, and water.

The subjects were discussed by **MRS. VIRGINIA K. HASCALL**, **PROF. D. S. MARTIN**, the **PRESIDENT**, and the author of the paper.

April 9, 1888.

STATED MEETING.

The President, **PROF. J. S. NEWBERRY**, in the chair.

Seventy-one persons present in the Geological Lecture Room, Columbia College.

A paper by **LIEUT. THOMAS L. CASEY** was read by title:—

ON SOME NEW NORTH AMERICAN RHYNCHOPHORA.

(Published in the Annals, Vol. IV.)

MR. GEORGE F. KUNZ exhibited a jadeite tablet from Honduras. It measures about six and one-half by four and one-half inches, and is one-half inch thick. One side is carved with a rude representation of a face, with pendents hanging from the ears. It is evidently Maya work, highly polished, and one of the finest jadeite relics known. The perforations indicate that it was worn as a breastplate.

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Evolution.
and its
Moral Ideal

longer speak to our higher faith. But these in no way interfere with the eternal truths he taught: they do not prevent us from entering into the relation he has opened to us between the soul and God.

Oxford, June, 1891.

Unit. Rev.

EVOLUTION AND THE MORAL IDEAL.

By Christopher Pearse Cranch.

The doctrine of evolution seems to furnish the long missing key to vast storehouses of scientific and philosophic knowledge, and to go a great way in explaining some difficult problems of life and the universe. It is like some great change of position, lights, and scenery, lifting us above and beyond the bogs and low, muddy, land-locked flats of life, transferring us from winter to spring and summer, and showing us glimpses of boundless distance and proportion, aim and direction, of which the world was long in ignorance. It has revolutionized all our old conceptions of the order of nature and Providence, questioned the ancient foundations of religion, modified rules of morality, and made whole libraries of old text-books useless.

But I doubt sometimes whether it has been equally successful in solving some of the deeper problems of our spiritual nature and condition. If the evolutionists claim to cover the whole ground of the origin of man by beginning with nothing but inert matter, or even following up the changes and developments through natural selection and the survival of the fittest from the lowest animal life, their philosophy seems very questionable. Their marvellous conversion of matter into mind, or even their easy transference of voluntary natural selection into the realm of human volition, seems like extraordinary performances of logical legerdemain, and especially unsuitable for radicals who have long since given up supernaturalism.

If the mind or soul of man be only a higher degree in the scale of physical or even social development, then of course it is easy to admit that the moral law may be only a further statement of the utilitarian creed. But the difficulty for the evolutionists is plainly enough much further back. For the problem is, how to account at all for mind, for conscious intelligence, and all that distinguishes man from the brute. If they can do this on the purely physical basis of development, then it becomes comparatively easy for them to proceed to evolve the moral ideal out of the principle of utility. The lame and impotent conclusion here involved must become apparent to all but the most old-fashioned materialists.

Whatever force we allow for the cumulative power of experience, can we see how anything greater (except in degree) could be evolved than a principle of selfish though refined expediency? Mankind arrives at a belief that what is found by long experience to be best in the long run for individuals and communities ought to be sanctioned by custom and enforced by law. But what hinted to us that there could be a higher law,— higher in something else than degree? And what sanctioned this law for us as divinely authoritative?

If the sense of the higher law, the ideal life, came by evolution, there must be steps in its progress hidden from us: the soul itself of man must have been from the beginning a co-factor with nature. Expediency furnishes only so much moral habit and law as is absolutely necessary to a respectable and comfortable life on a plane higher than barbarism. It leaves unexplained that vast surplusage of conviction and sentiment which rises to the dignity of a commanding and divine law,— that divine excess of conscience which makes great heroes and martyrs and all great souls, inflamed with an ideal in which self is lost in a conviction of truth and a desire for the good of others. As Dr. Martineau says, "We cannot elaborate the delicate sanctities of private duty out of the coarse fibres of public self-interest."

There are some who intimate that our moral ideal may be accounted for as the natural result of long hereditary training, something transmitted through a line of ancestors,— as in Emerson, who was the child of many generations of spiritually-minded ministers. But this only puts the solution of the problem further back. What was it that first emphasized and established in such persons the supreme value of the moral ideal? Its origin, survival, and growth, quite apart from any view towards beneficial results, must be accounted for. Whence the conviction so steadily pressing in, that the spring which fed the river was a fountain of living waters,— was super-physical, super-intellectual, super-expedient?

This instinct does not lose a particle of its mystery under the strongest focus of critical analysis. And the keenest philosophy of to-day not only shows the utter impossibility of tracing its lineage from the bald old doctrines of utilitarianism, but refers it to a source somewhat hidden from the critical understanding, but present in our unconscious, or rather subconscious, life.

I think we can never cease to wonder at the origin or first appearance of a soul essentially human,— a being with spiritual and fraternal relations,— the first emerging from the brute of those faculties which are not simply supersensuous, as intellect widening out of animal instinct, with its wings of imagination and adoration of something it conceives to be higher than itself, and differenced from all other creatures by the marvellous gift of speech, but of conscience, constituting itself the supreme law-giver and judge in human conduct, in the regulation of our lives and our relations to our fellows; and along with the growth of conscience the idea of a God, perpetually enlarged and purified with the experimental knowledge and growth of the race.

These two ideas must grow together and shape our conception of the reality they reveal.

In a large and generous development, morality and religion are inseparable. I am aware that there are certain crude forms of religion which have always existed quite dissociated from a right standard of morals. A Calabrian brigand may be actually very devout in all the religious sentiments and observances required by the Roman Catholic Church, while he will rob and kill with an easy conscience. The old-fashioned camp-meetings and the new Indian Messiah are sufficient instances, out of many that might be named, of what a crude and unenlightened religious sentiment may do. Nor, on the other hand, is it to be denied that unreligious and even atheistical persons may be quite conscientious in the discharge of their duties to their fellow-men.

The religious sentiment is one of the easiest and earliest developments, a sound morality one of the latest and most difficult. In its early stages, religion was a matter quite apart from the conduct of the life. In modern life, creed and character are expected to run together. Our theories even make them one, comparing them to a plant striking its roots firmly in the earth and striving upwards in the air with its leaves and blossoms and fruit.

Still, I presume all right-minded persons are agreed in maintaining that of the two elements the moral is the essential. It is of course the sort of life we live, and not the religious creed, nor even occasional religious emotions, that the common sense of to-day recognizes as all-important.

Thus morality feeds and sustains religion far more than religion does morality. It is on the root that we must rely for the growth of the plant. But in a well-developed mind and character the two should blend and harmonize.

In what I have to say, though I would not dissociate the two, I would lay the chief stress on that law and ideal which has to do with character, or the conduct of life.

That man, who was (as we suppose) a mere animal, has succeeded in evolving these ideas of God and of duty; that he has erected them into a commanding religion, or, rather, has woven religion and morals into the web and tissue of his life,— seems almost too wonderful to be ranged in the regular order of creation. And we can account for it only by supposing there was from all eternity, as now, a Divine Life brooding over our human lives, and waiting to authenticate itself as soon as the necessary conditions of human life demanded its manifestation in character; that there must have been a spiritual factor at work in the original germs of things,— a rudimentary soul in our anthropoid ancestor,— or even as far back as the primeval fire-mist, in which were scattered, as it were, the seeds of future humanity; in short, that there must have been Involution before there could be Evolution.

And this seems to be a necessary tendency of scientific hypothesis, as when Professor Tyndall published that memorable statement where he says: —

> Abandoning all disguise, the confession that I feel bound to make is that I prolong the vision backward across the boundary of the experimental evidence, and discern in that matter which we, in our ignorance and notwithstanding our professed reverence for the Creator, have hitherto covered with opprobrium, the promise and potency of every form and quality of life.

I am of course convinced that (as Mr. Fiske has so well shown) man has only thoroughly become human through society,— by the organization of family ties, by the prolongation of infancy, and the consequent experience of gradual knowledge, together with the fostering of filial and parental relations; by the formation of tribes, communities, nations, — bound together by agriculture, commerce, the arts, etc.

But, if the sense of expediency was at any time the entire social cement in human society, how can we account for change, however gradual, of the merely useful into the religiously moral factor? The link between the mental and the moral factors is not made manifest.

We are obliged to date from experience, long, various, and complicated. If we speculate on the periods before experience, and by this I mean social experience, we grope in the dark. Who can tell when and where the first ray of the moral ideal came, any more than he can tell when and where the retina of the eye receives the first dawn of day?

In the complex and accumulated experience of the race, more especially when consolidated and stamped as members of social organizations, we must, I think, make account of changes and developments in which there have been spiritual factors that elude the exact scrutiny of science. Otherwise, how can we bridge the chasm between the rule of action that looks only at good results and the rule which looks to what ought to be? It is more than experimental morality: it is an ideal moral law that is to be accounted for.

The rudimentary conscience is thought to be of very ancient date. Some animals, no doubt, possess something like it. But is it ever developed into anything approaching the *human* moral sense, unless in very rare cases, and these under the continuous influence of human society? The experiment how far ethical training may be carried in animals has never resulted hitherto in anything more than certain inherited aptitudes. The entire physical organization must be so changed by the slow processes of natural selection, extending through countless periods of time and in certain determinate lines of organic life, that a totally new creature is formed. The best ape-life ends where it began. The ancestral ape, if it was an ape, must have been such a superior sort of aristocrat in its line that its human tendencies would survive in a direct line of cumulative progression.

The evolutionists may be right when they say, as Mr. Fiske does, "Through the complication of effects the heaping up of minute differences in degrees has ended in bringing forth a difference in kind." But this is only a broad statement of a marvellous result, covering vast periods of time, and about which we can only speculate; for it omits the processes of change, and only looks at the final outcome, which is a very different thing from tracing the steps by which we arrive. I find that the evolution philosophers take this immense transformation (for such it is) much easier than their premises ought to allow. Between man and the highest dumb animal, in whose organization, physical and mental, there is no approximate sign of that human power that is "like a star, and dwells apart," the chasm is bridged by no scientific discovery.

No doubt we find our poor relations as far back as in some very humble specimens of the animal kingdom, and very touching and suggestive this recognition often is. But we get little light on the development of what we consider as purely human out of the lower organizations. And nothing but a specially — I don't say, supernaturally — organized anthropoid, with persistently aspiring and incessantly recurring traits, and in higher direction and under a most fortunate environment, could ever give us much satisfaction and pride if hung on our walls as a genuine ancestor.

I think that, even were the chief missing link discovered, we must still look upon the first human pair with a wonder that dwarfs all the miracles of time. The strict rule of the scientific spirit, which to-day dominates all the highest thought of the century, is naturally very intolerant of anything like supernatural intervention in the development of the higher life of man. Even anything like a leap from a lower grade to a higher, or anything other than a slow and gradual evolution, is frowned upon as unscientific. All the mystery and the miracle of past ages of belief go into the remorseless crucible of science; and mythologies and theologies, no matter how venerable and sacred, come out of it as plain, earthy matter of fact, with hardly a particle of divine star-dust left glittering behind. Nothing is suffered to pass muster in its old name and quality and appearance. We are even denounced if we evince the slightest inclination towards the mysterious and unknowable. And the philosophers affirm that, as things are known in themselves and not merely in their phenomenal aspect, as in a mirror, there is nothing in the universe that will not sooner or later be revealed, and such a term as Agnosticism will be totally unknown.

I for one would be the last to withstand the demands of the "scientific method," though Dr. F. E. Abbot almost cracks it like a whip over our heads, and would compel all the thinkers of every sort of intellectual and emotional tendency to move straightforward in the logical lines he has marked out. But, ah! how much knowledge is to be gathered in, and how painfully and how gradually have the great processes of nature come about! And how much truth there is that we are sure of, and yet which eludes the touch of science!

And, when I think of this, I cannot help feeling a little charity for the old *régime* of the supernaturalists. They were ignorant of the laws of nature; and now and then they were aware of things that were so wonderful that they insulated them and assigned them a separate and superior niche: in a word, they were miracles. And there could be no philosophy or theology that was not starred and emblazoned by these supernatural lights.

But we have changed all that, and are swinging, perhaps a little too freely and jauntily, in the opposite direction. According to the oracular statements of some of our newest authorities in philosophy, there need be nothing wonderful in the whole universe. For we "know things as they are." The scientific method is capable of dislodging all mystery in its remotest hiding places, and bringing it down into our common daylight and every-day events and things. As Carlyle says, "The creation of a world has got to be little more mysterious than the cooking of a dumpling."

Indeed, the Cosmos, the All, has become not merely a symbol for God, but a synonym. We used to say: God is Spirit: the universe is a manifestation of Deity. He transcends all limitations, all conditions. Now God is not only immanent in the universe, but he *is* the universe.

Such seems to be the creed of that new sect of speculators who call themselves "Monists." Monism means that the whole universe is in accordance with one law or principle (which, by the way, is by no means a new idea). God is conceived as the Order of the Universe, rigidly excluding anything like personality, though of the most transcendental order. And there is nothing to prevent the human mind from knowing this order, for there are no limitations to the human faculties.

Monism pretends to go deeply into ethics. According to Dr. Paul Carus, author of "Fundamental Problems" and editor of the *Open Court*, thought is the origin of the moral sense. And yet thought is the result and development of sensation and feeling. Conscience is only taking thought. Ethics can only be based on knowledge of facts.

> "The beginning of Ethics is to reflect upon ourselves, our surroundings and our actions." "Before we act we must stop to think." "Conscience is the combined experience of innumerable lessons, taught us by our teachers' injunctions, and by observation of surrounding events."
>
> "By conscience we understand the sum total of all those impulses which serve for the regulation of human action." "Its principal feature must be that of examination." — *Ed. of the Open Court.*

Thus Monism applies the scientific method to the construction of the faculties of the soul. But it reaches out its immense and audacious tentacles and tries to grasp the entire universe and the soul of the universe, just as an astronomical professor designates (symbolically) the stellar spaces and orbits on a blackboard.

With a special scaling-ladder of patented logic, the new philosopher ascends those heights where angels fear to tread, and finds his scientific measuring-wand sufficient to take the sum and dimensions even of the ineffable Source and Soul of all! For one, I cannot help wondering that such attempts at revolutionizing philosophy should be considered other than a leap into the Inane on the back of some logical Pegasus, which may turn out to be as fanciful as the Pegasus of the poets. If we can by searching bring down God to the level of our eyes, and of our cold, critical understandings, why not at once carry him in our pockets, like the South Sea Islanders?

Science is the universal solvent, is it? But has Science ever explained the first familiar fact of our experience? Has it ever told us how the human reason has ever delivered the simplest thought to the tongue, or how the will ever operated in enabling the hand to write it on paper? Has Science ever found a bridge between the immaterial will and the material implement? Familiar as the hiatus is between mind and matter, has any one ever explained the mystery of it? This "Scientific Theism" seems to me quite inadequate to deal with the great themes it proposes to handle so neatly and so completely.

According to Mr. Abbot's view, scientific theology is the ground of liberal religion. It used to be thought that religion came first and theology second in the mental order. Theology is the application of reasoning to the deeper matters of faith. But to enlighten our faith by our theology is one thing: to ground our faith upon it is quite another, and seems (in vulgar parlance) like putting the cart before the horse.

Was it ever meant that the pure intellect (which really constitutes so small a fraction of our life) —that the cold, cultivated, trained reasoning faculty, apart from emotion, imagination, symbolic conception, and all the tangible and intangible cohort of helpers from life and experience —could fathom these abysses of spiritual knowledge? Must we make no account of that unconscious (or subconscious) life, that background of faith and affirmation, from which pure intellect draws so much of its sustenance and virility?

I rather think that this system of philosophy is lacking in some of the great elements of vital truth. And, however comprehensive and exact it may seem, it will miss its mark, and its needed complement and correction will be brought by philosophic minds among us which are less rigidly *doctrinaire*.

A great deal is said about Agnosticism. Dr. Abbot has no toleration for it, and constructs ingenious ways to get us out of the labyrinth. But, after all, is it possible for us to avoid a certain degree and kind of Agnosticism? It all depends on the measuring-wand we apply to the vast reaches of these lofty truths. Agnosticism, as Mr. Salter well says, is only the recognition of our intellectual limitation. If the scientific method is the true one for all truth, of whatsoever kind, I can, in my humble opinion, see only failure in the attempt.

It seems to me that a great deal of the new philosophy is like a great deal of those old philosophies of the Greeks,— even of Plato,— which I cannot help somewhat irreverently calling *logic in the clouds.* The reasoning may be all right; but are we quite sure what we start from, where we stand, and on what?

I think there is an instinct in us that we are immersed in Being and Life,— taking in only as our limitations allow, like buckets dipped in the ocean,— and cannot measure the boundless element in which we are drifting. And yet there are intimations that come to us, we know not always whence or how, of great realities which are dateless and measureless. We have glimpses — too few, alas! and too clouded — of a great light. We have perfumes from hidden gardens, snatches of music from unseen orchestras, electric thrills from distant yet abiding centres, inspirations from something far above us, yet in some sense in us. Men may make celestial maps of the heavens, but the heavens can never be imprisoned in definitions and diagrams. That which exists at the centre of things touches us at the circumference in every pore and avenue of thought and feeling, if we are only alive. But it is not to be adequately described, not to be packed into a system or a creed.

But this is, perhaps, rather a digression, and I come back to my thesis. The origin of the moral ideal, the growth and development of ethical religion, is explicable only on the affirmation and verification of a human soul-germ, sustained by a Divine Life and Purpose in the universe. The completest test of this is our progressive experience. The experience of the race is the basis on which this is manifest and vital. Experience is the matrix and mould for the incarnation of the all-pervading life. *Solvitur ambulando*, as the scholars say. Life is the main fact and principle of things. It is only by living, thinking, feeling, acting, growing, in social relations, that the life of the soul is quickened, that morality and religion grow and spread, and that we find sufficient reasons for the faith that is in us.

The grandest idea in the whole evolutionary doctrine is this: that all nature has gone on developing from the crudest and simplest forms of existence through matter and mind, until man appears as the consummate flower of creation. As Shakespeare says, it is "the prophetic soul of the wide world dreaming on things to come." Life, life, and forevermore life, of a higher order, seems to have been the endless song and rhythm of the universe. If the morning stars sang together for joy, do not the great souls who from time to time have made the splendor of history join in a harmonious accompaniment to the hymns of creation? Life is the great universal fact. Death is only the change of condition inseparable from life. Life is more mysterious than death. That souls should be perpetually born into visible existence, should associate in tribes and towns and nations, and a union of belief and purpose, building up for themselves such a wonderful environment in their material, intellectual, artistic, emotional, and ethical development, with a tendency more upward than downward,—that this tendency should be not a substitution of prudence for a divine command, and not towards disintegration and destruction, but towards newer and higher life, physical, mental, spiritual, till immortality is acknowledged as the ultimate reason and end of existence,—surely, here is the beginning of a new gospel, an evangel inaugurated by science, confirmed by philosophy, consecrated by poesy, crowned by religion in faith and hope.

The old heresy of Materialism is vanishing into the outer darkness. Our modern civilization has got far beyond it. The doctrine of the ever-living God incarnated in man, in the race, lifting that race to ever higher levels, till the kingdom, or rather commonwealth, of heaven descends upon earth,—surely, if this be in great part the ministry of science, let us not refuse to acknowledge the debt. But, then, science must be understood to go hand in hand with the heart, the imagination, the upward aspirations and adorations of the soul. Science must not become an omnipotent machine. Intellect must suffer no divorce from feeling. Theory and logic can only grope a little way in the dark. The soul of man must move as a unit towards every noble sphere of life to which it is summoned. Through the ministry of the lowliest and the loftiest experiences it must be known to itself and its fellows, working its way step by step, till it attains the end for which it was created and preordained.

Evolution, as it has operated in human history, exhibits a great law, by which, in place of the involuntary selection governing plants and animals, there is a transference into voluntary, intellectual, spiritual selection. The fittest is seen to survive in those faculties of the human soul that dominate the lower ranges of existence; and the intelligence and will and conscience of man, in association with other men, become the great factors in the development of the race,—become, in fact, a kind of delegated divine providence in the world of humanity.

Thus evolution in its highest significance explains the ideal life, and points to its legitimate and final consummation. It looks forward, and not backward. It fills the great drama of endless transition with a profound meaning, and conducts it to an end in accordance with our grandest hopes. If the roots of life are hidden, the leaves and flowers and fruits are known. The earth which has travailed in pain for millions of years, till at last is brought to light the human flower,—this earth we are prepared to leave as a dead and withered stalk. The flower must have a reason for blooming. Like beauty, the moral law is its own excuse for being. That reason we can dimly conceive, even in our earthly obscurity and limitations. But can its fragrance and beauty ever perish without falsifying all knowledge and experience? Or will death transplant it to a soil invisible to our material eyes?

The answer stands written, not in Oriental legends, not in bibles and creeds, not in the dreams of mystics and theologians, but in the entire record of the past, as in the knowledge, faith, and hope of the future.

DISSENT IN RUSSIA.*

By Cornelia W. Cyr.

There is in Russia a population of nearly thirty-five millions of dissenters from the Eastern or State Church, composed of Protestants, Catholics, Armenians, Jews, Mohammedans, and Buddhists. Until the time of Peter the Great the inhabitants of Russia were all "orthodox," with the exception of some Tartar Mohammedans; but, as the empire extended its limits, a legal existence had to be allowed to the religions of the annexed countries. The Pole was permitted to remain Catholic; the Tartar, Mohammedan; the German, Lutheran. But the Russian must belong to the orthodox Church.

Russia is ready to tolerate and even to subsidize all religions, on the one condition that they submit to her autocratic power, and do not encroach on the domain of the National Church. The law proclaims them all free, both to the individual conscience and to the exercise of public worship. The principal street of St. Petersburg is called "Toleration Street," from the fact that on it we find not only the orthodox cathedral, but also Lutheran, Catholic, and Armenian churches. The Russian people are naturally tolerant. If they place restrictions on religious liberty, it is more from political than religious reasons. The Russian Church is so united by history and custom to the very existence of the Empire that it seems impossible to be Russian and belong to another Church. This it was that fused into one people many different races, and thus founded the Russian Empire. Church and State are so indissolubly united that, in the minds of most Russians, religion and nationality, patriotism and orthodoxy, mean the same thing. Accordingly, dissent-

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* See articles in this Review for August, 1890, and February, 1891.

Evolution
from
Mechanical
Force

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EVOLUTION FROM MECHANICAL FORCE.

HUMAN KNOWLEDGE is, in some way, an interpretation of human experience, and only as we attain a correct evolution of experience can we fairly test or safely trust the science assumed to have been acquired. There is no occasion for prejudice against evolution, nor need there be any scruple in an application of the term to one's own or another's mode of thinking, since all thought will develop itself in some mode of accounting for what has been experienced; it may be from a view of but one side, or it may look quite through to that which, beyond experience, has determined how the experience should be, and the measure of the development will quite surely control the method. We shall thus have different grades of evolution, and even if the partial were correct as far as it goes, and inspiring much confidence while incompetent to recognize its deficiencies, yet must it be quite unsafe for teacher and disciple, and both alike will need to be led to higher and clearer points of observation. Each should come to think and know for himself; hence each should seek this elevation, and only the higher intelligence can say what the lower does know and what he does not know. It is the clearest mind only which may be allowed to testify with an authority not to be questioned. With adequate capacity and honest application, it may perhaps become competent to secure a common conviction in an ultimate test of all science by the one sufficient and sure philosophy.

The grades of evolution will be determined in the psychology adopted; nor can any grade be elevated in mode or measure but by completing the psychology and thereby correcting the logic. Nature is to us what we know of it, and different processes of thinking lead to quite diverse modifications of comprehension; and also, with common native endowment, some will cultivate and use one intellectual faculty with no recognition and application of another, in which way there must be consequent delusion and contradiction. Earnest controversy must then beat each back to the point where he may stand within the common right of all. Not very seldom is it, that the soonest and surest way to bring the faulty to true conviction is found in forcing the false theorist to take upon himself the restrictions of his own doctrine.

It is here proposed, by as short and plain a method as is practicable, to present the distinctive gradations of evolutionary theories which can, either partially or completely, have their development from human experience. There are three distinct modes of evolution possible to be intelligibly so presented as clearly to be inclusive of all that can be; the first and second respectively taking the two sides of experience, and the third comprehensively combining the former two in one, making from them all that need be. The first is from a psychology regulating experience by the impressions its objects make upon the organs of sense, and is distinctively *evolution from mechanical force.* The second is from a psychology regulating its experience by the mental activity of the subject, and is distinguished as *evolution from spontaneous thought.* The third is by a psychology which regulates experience from its substantial grounds and causal sources, and thereby intrinsically connects object and subject together, and is exclusively *evolution from " sufficient reason."* The first is essentially gross *materialism;* the second is pure *idealism;* and the third is *universal realism* of both matter and mind. The occasion makes no call for appropriating the respective theories to any responsible names, since we take them to be, each in its way, essentially an origination from experience itself, and that together they are exhaustive of all experience; yet doubtless, to all ordinarily informed readers, these responsible names will have ready recognition proportioned to their eminence and authority.

With the theory of evolution from mechanical force, the successful researches in modern physical science have been somewhat largely connected, and popular interest has thereby been awakened in its speculations. The way, also, in which it has been brought to bear upon the higher questions in philosophy and religion, and the sharp controversies as well as learned discussions that have been induced, have all conspired to quicken public attention, and some anxious solicitude in reference to ultimate results, more extensively toward this than any other formally advanced scheme of development. This adds but a factitious importance to it, while in itself it is the least and lowest of the three. Its general statement may be given in the following short compass: *The universe, so far as yet within human experience, has been continuously evolved, through past eras of indefinite duration, from a primitive but inscrutable absolute force.*

1. *The Psychology Applied.*—The key to all coming explanation is to be found in a few psychological facts which are made to be regulative and determinate for this grade of evolution. We withdraw attention from all not essential to an interpretation of the process.

All the special senses have each their respective expansion of muscular tissue, to receive the impress which may be made upon it. That for the touch takes its impress *directly* and all the others *indirectly*, and thus the organ of touch is the basis and ultimate test for all the other senses, since they transfer their impressions to the place of impress for the touch. All impress upon the muscular tension in touch is met by the muscular pressure upon it, and in the contact there is consequent co-resistance, and thus necessarily the correlatives of impress and repress, with every sensation of touch, must stand revealed in consciousness. The impress is both impervious to, and spreads over, the repressing muscular tissue; and hence the object in consciousness is at once *impenetrable* and *extended.* So also, in its way, there is impress and repress in every sense-organ, and thus all perception of sound, color, savor, and flavor must be correlative, as well as the tangible perceptions. *All perception is relative.*

The peculiarity of the evolution of force is, that it notes the objective impress, and almost altogether disregards the muscular pressure. The impress gives its distinctive solidities and definite superficies, and thus fills its occupied place; and the entire body in larger or smaller place is made up of contiguous points of contact, each of which may have its co-resistance on every side, in every direction; and thus bodies are distinct and definite not only, but are molecular compounds, with each elementary atom external to all others and independent in its own place, and as separately identical, the logical law of the excluded middle is universal. All contiguous bodies may be noted in any direction and then in its reverse, and are thus consciously in *place;* all successive series can be noted in but one way irreversibly, and are so consciously in *period.* All conscious fact is fair for science, and all beyond consciousness is nescience, and *consciousness is ultimate test for all science.*

What has been in conscious experience may be retained in memory, tradition, history, fossil, and geologic preservation, and again recalled as literally *re*-semblances of experience; and so taken in conscious reflection they become conscious empirical thought, and may be subjected to analysis, abstraction, and generalized classification through all categories in exact science. The ordinary habitual adjustments of the senses, and assisted scientific observation and experiment, may legitimately be employed in attaining the invariable order of experience, and therein also the law of evolution. Patient induction of the invariable past is taken as pledge of like order for the coming experience, and scientific law is grounded in the fact of conscious correlative order in all changes. It is deduced from what has been experienced, and can never be presumed as the prior determiner of experience. Thus all thought must be of *the relative;* and evolution must have its *prior,* but consciousness cannot grasp an absolute *prius.*

Muscular tension induces locomotion, and habitual adjustment finds the order of antecedents and consequents in moving bodies, and calls the invariable order in experience *law of motion,* but only as *fact* of order, and not as precedent *efficient* for it. The muscular pressure and objective impress may be known as *force*, and their equilibrations and preponderances may be empirically estimated, but the energy which urges the pressure and impress is an inscrutable secret to the consciousness. Like the bell, the tissue is stricken before the internal vibration, and consciousness gets only the swell and strain of the muscle, not its originating causal efficient. *Inductive science has its basis beyond itself.*

2. *The meaning of mechanical evolution.*—Its elements are separate and single, and can come together only in aggregation, with no possibility of conception that one comes out of another; hence the difficulty of any intelligible signification to the term evolution, as applied merely to collocations and successions. The process is but a composition of parts that in themselves never change. There is, however, a method and order by which they come within conscious experience, and also varied comminglings and proportional compoundings, which make perpetual transformations, and continual conversions of old into new bodies; and the fact of such conversions with its general order is known as the *law of evolution*. It is on this account that its law is solely an answer to *what*, and not at all to *why*, is evolution? It has no causal efficient, but only uniform sequence, and has the following representation:

Progress implies aggregate movement toward an end; it may be toward happiness or toward ruin, but the whole approaches some goal. Evolution differs in this, that it is continual transformation of parts, and all advance of the aggregate is in and through this perpetual conversion of the constituent portions. The structural outcome is from the particular transmutations, beginning in similar singles, and gathering them in augmenting unlikenesses, and then converting the unlikenesses to greater consistency, and the whole to more complete integrity. It is one and the same fact ever transpiring in human experience, "in the development of the earth, in the development of life upon its surface, in the development of society, of government, of manufactures, of commerce, of language, literature, science, art," and according to the materials wrought out may be distinguished as "astronomic, geologic, organic, ethnologic, social, economic, artistic evolution;" in all working with the invariable regularity of universal experience. Consciousness itself is psychologically an evolution, and experience develops itself in conformity. The primitive co-resistances are similar in their respective organs, grow more unlike, and the reflective process thinks them into definite conceptions, complete judgments, and comprehensive conclusions. So also an organic germ, under constant inspection, evolves from original simplicity to growing dissimilarity, the differentiations augmenting with the maturing embryo, and passing through gradations of more complicated contexture, attain at length the integration of a complete organism. In the opening stages evolution is ever from like to unlike; the unlikenesses more and more complex.

This opening stage has been deemed too little discriminated from dissolution. Decay commences by converting assimilated parts to dissimilar states, and the differentiations become broader and more complex between the sound and unsound portions of the structure. But if little different at the opening, the advanced stages are widely dissimilar. Dissolution goes on to complete separation, while evolution works its first distinctions into more compact parts, and these into more symmetrical structure. Hence the formulated definition of evolution is given as "*a change from indefinite inherent homogeneity to definite coherent heterogeneity.*"

We here remark that the fact as conscious order is noted, with no glance toward the executive efficiency. The distinctions of evolution and dissolution are also misleading. In themselves they are the converse of each other, one undoing what the other has done; yet are they not exclusive each of the other. They both belong to experience, and are a development in experience, and each needs and subserves the other; the disintegrations become subsequent elements for evolution. All experience of life and death is an evolution, and the transformations of the future must come from those that have passed. The universal solutions are the sustenance of the vegetable, and these in turn of the animal. And consummated evolution will have converted into itself both the dead and living.

3. *Causes of Evolution.*—This search for the causes of evolution is an analysis of the essential elements to attain the ground-fact of them all, in the most comprehensive form in

which it underlies and interprets all the others. It is not attempting to find an efficient cause, but a prime antecedent to the evolving process. The inquiry is, "May we seek some all-pervading principle which underlies this all-pervading process?" and the hopeful issue is the possibility of interpreting the law of evolution as the consequent of this "deeper law beyond which we may nevertheless be unable to go."

The analysis is as follows: Both dissolution and evolution result from *changes*, but distinctive for evolution is the fact that its changes are of the *internal* ultimate units and masses of units composing it, viz., *matter*, as the essential ingredient; *motion*, in the parts arranged; and *force*, in the production of the movement. The problem is thoroughly *dynamical* and purely *physical.* An application to these elements of the terms *phenomenon*, *appearance*, is alleged to be delusively misleading, as if the facts were only phantoms, and the recommendation is to substitute for them the term *effect*, carrying along with it its correlative *cause;* but it is evident there is thus opened a wider door to more dangerous liabilities on the other side. Such substitute, together with the true meaning of the term *real*, it is expected will obviate all danger of falling into empty idealism.

The significance of *reality* is held to be equivalent to *persistence in consciousness*, the persistence being of the co-resistances, whereby there will be perpetuated the correlations in which conscious realities consist; just as we discriminate between an *ideal* and a *real* man, where we dismiss the former from mind at pleasure, while the real man abides in consciousness persistently, despite our opposing inclination, when standing obvious to the organ. Also, when the organic tension is suspended and the perceived object vanishes, and unavoidably we have the notion that somewhat still abides amid all change of appearing and disappearing forms, the fact that then it is the *persistent* in the notion which makes its absolute reality, gives the clear implication that persistency is ever our ultimate test of reality. And then comes the notable argument, from this last hypothesis, for the justification that this unavoidable notion, persistent as absolute reality, may be logically used as if it were a relative; and which is to this purport: Reality, as we think it, being no more than persistence in consciousness, the result to us must be the same, whether what we perceive be the Unconditioned itself or an effect wrought in us by the Unconditioned. "Were the Unconditioned itself present to thought, it could but be persistent; and if instead of it there be present its persistent effect, the resulting consciousness of reality must be exactly the same;" and from which follow these three conclusions, viz.: 1st. "That we have an indefinite consciousness of an absolute reality transcending relations, which is produced by the absolute persistence in us of something which survives all changes of relations." 2d. "That we have a definite consciousness of relative reality, which unceasingly persists in us under one or other of its forms, and under each form so long as the conditions of presentation are fulfilled; and that the relative reality, being thus continuously persistent in us, is as real to us as would be the absolute reality, could it be immediately known." 3d. "That thought being possible only under relations, the relative reality can be conceived as such only in connection with an absolute reality; and the connection between the two being absolutely persistent in our consciousness, is real in the same sense as the terms it uses are real." From this it is assumed that "we may resume, with entire confidence, the realistic conceptions which philosophy at first sight seemed to dissipate."

This is their way of saying what is *reality*, and which we now critically examine, and show wherein it is deceptive. It is important, and may not be difficult, to expose both a defect and a delusion covered in the first deduced conclusion, as above; and when the illicit deposit has been fairly noted, we shall find ourselves at liberty to dispense with any further critical examination of the other two conclusions, since they will have been deprived of all show of logical consistency. The *delusion* is from the assumption that "absolute reality" can stand in an "indefinite consciousness;" and the *defect* is, that "the something absolutely persistent in us" can, in this psychology, find no "sufficient reason." A familiar psychological example may serve to guide our conception.

An apple in hand may stand as representative for our perception of universal relative realities. A muscular grasp will at once give in consciousness distinct impenetrability and definite extension, from the co-resistance of the tension and repression.

And also, further than the touch: indirectly through air, light, effluvia, and sapid solution, the other sense-organs will have their respective co-resistances, which will transfer themselves to the place of the touch, and there and then, in place and period, will be together grouped the *relative realities* capable of belonging to the object in experience. Anon, that object, in some manner, becomes lost to every sense, and clean gone from consciousness, and haply may be eaten or chemically resolved into its primitive elements. Yet unavoidably the notion arises, that some way the existence of that apple is still persistent, no matter what the change; and such notion in us is of its *absolute reality*. Whence that notion? It cannot at all be from consciousness, definite or indefinite. Whatever consciousness has had might be left in memory, and called up in reflective thought; but if all were there in full recollection, the whole would be of the relative persistent, and not at all of the persistent absolute. That is unavoidably present in some other way than by sense-observation or any reflective deduction from past experience. It is not independent of experience; but by an insight into conscious experience itself, there is the forecast to somewhat that was requisite *prior* to the experience, or that experience could not have been. This prior requisite would have been the same in the presence of the conscious relative when every sense was quick and active in observing; the sharper insight than the sense-perception would see in and through the relative realities what, precedent to them, had been a sufficient reason for them, and in the absence of which their existence would have been impossible; and to that insight this same notion of the absolutely persistent would have been equally inevitable. Not only is it not deductive; it is not any more arbitrarily presumptive, or an imaginary presupposing, but the legitimate and inalienable right of a humanly endowed being to demand a prior adequate cause for aught that consciously is. This is in quite another capacity, and opens an occasion for quite another faculty to work than that of inductive or deductive thought, both of which, in following conscious observation, are one and the same thing. The absolute cannot be in nor of consciousness, but is that which is antecedently requisite for consciousness; consciousness is conditioned by the absolute, not the absolute by consciousness, either definite or indefinite. When this larger capacity, taking into itself all that sense receives and reflective thought demonstrates, and comprehending all their working, shall have been generally distinctively recognized, the delusion that absolute reality can be known in consciousness, and the psychological defect that there is no other capacity for the absolute but consciousness, will be no more.

In such recognition also will pass away all need of criticising the self-contradictory suppositions of the above second and third conclusions, of "a relative reality as real as an absolute reality would be could it be immediately known"—and that the relativity of thought may necessitate the relativity of the absolute itself. We shall find both the delusion and defect frequently occurring in this analytical search for an evolutionary starting-point, by cursorily noting which, as we pass, we shall get better acquainted with, and familiarized to, this higher faculty for apprehending absolute efficient causes.

We come back again to the analysis—the elements, in common, of *space and time.* When one presses the hand upon some substance, the co-resistance of hand and substance gives conscious object in place, and also as perduring in period. By abstracting, in thought, the co-resisting contact, the void place and period of the object remain, which leaves pure space and time in consciousness. They are the pure forms of the co-resistance, viz., that of *co-existence* with no pressure for space, and that of perduring *sequence* for time; and so space and time are abstractions, relatives of realities, and persistent in consciousness as place and period only, whether larger or smaller; and inasmuch as they are the forms of the co-resisting contact of hand and substance, they are the consequents of the pressure, *i.e.*, of conscious *force.*

And here, we remark, comes up again the delusive defect of the adopted psychology as follows: Space and time, which are but place and period, may in thought be so enlarged or diminished that they shall indefinitely only stand in consciousness, viz., one portion in consciousness, while so increasing or lessening in thought that another portion gets beyond conscious recognition; and yet in each case of enlarging or diminishing they unavoidably give the notion of their absolute persistence still, and thus we have absolute space and time persistent in an indefinite consciousness; and then comes the inquiry, What are they? Does the relative space and time come from some form of absolute space and time? The answer is, "These are unanswerable questions." We can only know that relative space and time are persistent realities, and imply absolute realities equally persistent for us; and so the relatives may unhesitatingly be our basis for valid scientific demonstrations. The notion is, that the absolute is persistent, but persistent *as* absolute, or non-relative, only as it passes out, larger or smaller, beyond conscious conception. Surely, we say, this is a most defective, delusive, self-contradictory notion; and yet the only one that a psychology ultimating in consciousness can give. On the other hand, the higher capacity, reaching an adequate reason, takes the relative, both of function and execution, into its comprehension, and at once sees in them that their relative places and periods could not be, but as an absolute space and time before them was; that the relatives are *in* and not *of* the absolutes; and that both the absolute space and time are concrete, and not abstract, wholly integrate and indissoluble, and can no more have limitation or mutability than the relative can have existence without limit and change.

In regard to the element of *matter*: the analysis finds that it is resistance to muscular pressure, and brought within consciousness by the contact and pressure of the organic muscle. Essentially in consciousness, it is the several points touched by the muscle, and thus the body of matter is a compound that may be augmented by additions or reduced by subtractions indefinitely. Its necessary conception, from its standing in consciousness, is atomistic or corpuscular; the smallest element and the largest aggregate have peripheral limit and internal molecular continuity. As the consequent of pressure and repression, matter in consciousness is based upon *force*.

Here, then, as with place and period occupied by it, there comes up the delusive defect in the psychology before considered. The atoms may be too small or the aggregates too large to be consciously conceived, and thus we have relative realities persisting in consciousness; and also persistent absolutes either way, below or above consciousness, and therefore in an "indefinite consciousness." All the absurdities of absolutes in an indefinite consciousness occur, and which cannot be thought as connected causation, nor as standing on any sufficient reason. The conception cannot be made self-consistent, except as brought within the recognition of the higher capacity that comprehends consciousness, and sees its prerequisite conditions.

The analysis of the element of *motion* is last. It involves *matter* moving, co-existence in *place*, and sequence in the *period* of moving; and thus includes matter, space, and time in its conception. The primary conscious motion is in the muscular tension and consequent locomotion of the member, or perhaps of the entire body. This conscious muscular tension and accompanying locomotion, and the reference of it to the body, or other bodies, at rest, give both the fact and the measure of the motion in experience; and the conscious muscular motions are symbols of material motion without conscious tension; and thus matter, space, and time must combine in all movement, and therefore all motion must come from their common source, which we have before found to be that of *force*. But matter at rest is found to resist moving, and matter moving is found to resist rest. How then may resting matter move, or moving matter rest? Must not the law of continuance necessitate a progress through the intermediate degrees, and thus require infinite space and time for any motion or cessation of motion? And so comes out again here the unavoidable notion of an absolute, and its deceptive ground for scientific demonstration, with the like necessity for an absolute, which may move without itself moving. But all this must come up a little further on more significantly, and will be answered more conclusively.

We have here come to the consummation of the analytical process in tracing up the elements of evolution to their root in consciousness, and found this to be a *Universal Force;* and so far as the analysis has been kept within the conscious relatives, it has been a logical procedure, and the attained result has reliable validity. The elemental facts have been all along opening to the unavoidable notion of a persistent absolute, and when for scientific use that notion of the absolute has been interpreted on the side of an indefinite consciousness, we have found its invariable delusive defect introducing self-contradictory conceptions; yet these do not vitiate what the consciousness has given, and the relative thought has consciously abstracted or deduced. But we are immediately coming to a point where an introduction of the inevitable notion of the persistent absolute is deemed to be a necessity, and we may be sure in this case to encounter actual, and not merely hypothetical, absurdities. There comes the necessity for a close discrimination between the conscious co-resistances, since we must take either the muscular pressure or the objective repress, one and not both, as the prime Universal Force. We proceed onward to it.

Evolution is a rearrangement of parts, and these parts must neither come from nor go to nothing, else the evolution may be required to find a beginning or come to an end. The force, as matter, must be indestructible and the movement incessant, and to secure such convictions we shall be driven to transcend consciousness. The question is one of *quantity*, and implies *measure;* and in determining the measure we shall be driven beyond the conscious universal force now attained in co-resistance to a simple resistant, as quite out of the reach of all consciousness, in the following way:

With the modern inventions for instrumentally sharpening the senses, matter and motion may empirically be measured with quite proximate exactness. By the ratios of gravity and motion, a *unit of measure*, as weight, may be found for determining the conservation of matter; and, on the other hand, a *unit of measure*, as lineal extension, may be found for determining the continuance of motion; but neither one is attainable except by the other. Given the one, and we attain the conservation of matter; given the other, we attain the continuance of motion; but empirically we have no way out of the vicious circle. The units of measure must accord in *units of force* and these must be of constant continuance. In *persistence of force* is to be found the *basis* for all inductive science; and of course this cannot be laid by science, which would be getting a second before a first. "Clearly, then, the persistence of force is an ultimate truth, of which no inductive proof is possible."

What is this force of which persistence is predicated? "It is not the force we are immediately conscious of in our muscular efforts, for this does not persist." "We are compelled to admit that force, as it exists out of our consciousness, is not force as we know it." "Asserting the persistence of force is but another mode of asserting an unconditioned reality without beginning or end." "It is deeper than demonstration; deeper than definite cognition; deep as the very nature of mind." This answers to the "*What* is the force?" But we are sure we ought more earnestly to inquire, *Whence* is it? If it had been the muscular pressure, it might somewhat plausibly have been supposed that we could consciously go back from the muscular contraction, through the nerve-irritation, to the spontaneous energy that originates all that follows: but it is the opposing resistance to this; and how then, even plausibly, are we to get down deeper than the conscious impenetrable extension, and know that primal energy which makes the impervious expansion? In this only is the true sufficient reason, the efficient causation, not at all solved by the getting of the primal empirical antecedent. And it is no pertinent answer to say it is "that absolute force of which we are indefinitely conscious," nor "that consciousness without *contents* is impossible;" for here is a force directly asserted to be "out of our consciousness," and which cannot be any "*content* of consciousness," since consciousness can recognize no content but a relative.

We here remark, the sole satisfactory explication of all this delusion in the attempted use of a persistent absolute is, that having been early and long habituated to outward observation, the outer and not the muscular pressure has been taken as the ruling element for the sense, and determining its objects; and then, when the analysis of matter has carried its atomic parts quite out of conscious observation, the higher faculty with which humanity is endowed has prompted the unavoidable notion of an absolute still persisting beyond conscious atomic existence, and which is here termed the Universal Force. But this faculty of reason, which alone could suggest it, is altogether unacknowledged in the psychology, and cannot be recognized as working in its own light; and so the whole is remanded to some modified sort of consciousness, which neither in perception nor thought can work with any thing other than its own relative realities. From this standpoint in the consciousness the absolute is meaningless, and might as well be called *Fate* as *Force*. The force in consciousness is but just one impenetrable atom preceding or succeeding another in an invariable order, while in the reason the force is that deeper energy which makes the atom impenetrable, and moves it intelligibly within the determining rule of an adequate causality. Let reason work its own problem, and it can use simple energies to limit themselves as the two sides of one thing, and thus combine in unity as an atom to which they have given their joint efficiency, and which can thus be thought as working intrinsically and extrinsically according to its native constituency; but the atom in consciousness can neither stand alone, nor work alone on another, and can never be an antecedent without another before it, nor an ultimate without another beyond it. Both reason and consciousness must have the like empirical elements, but they cannot work alike upon them. Consciousness must abstract and deduce, while reason by oversight and insight must see in these elements what beforehand was requisite for their being as they are.

The psychology, for the evolution we now investigate, cannot so discriminate between the absolute and relative, for its absolutes in order to be thought must be modified as relatives. Hence its Absolute Force, so soon as taken into use, becomes entirely a relative. It is persistent, but only as correlevant and equivalent; has balanced and unbalanced antagonisms, attractive forces moving in lines of greatest traction, and repulsive forces moving in lines of least resistance, and both in composition moving in resultants which are the compounds of all the forces, just in accordance with the relative realities in conscious experience, and known only in experience. The primitive force is taken in mass in its simplest elements: and yet the atomic elements gravitate; have centripetal motion; condense in more definite concomitance; induce heat, light, electricity, and chemical combination; with transitions, and revolutions: just as invariable observation has ever found in consciousness, and with nothing intrinsic in the force to so guide the thought, and only as reflection has found the facts to be from past experiment. And so, also, there occur rhythmic movements, or oscillations to and fro, direct and lateral, with double, triple, even quadruple complexities, the ratios between which may differ in time from a day and night to millions of years; but all determined from past conscious experience, by computing from what has been to what will be. So, also, there are assumed perpetual conversions and transformations; yet are all the converted elements but new compounds of old atoms, ever impenetrable, and whose identity never changes. These conversions carry the forces into and through all modes of being, material, organic, appetitive, intellectual, and moral; yet are the distinctions in all only modified compositions of the same atoms. The force is no intelligible efficient, determining the effects, and so directing the thought in its evolution; but the thought must come back from it to conscious experience, and there learn how it has gone.

This, then, is the conclusion to which an exhaustive analysis has come, viz., a persistent Absolute Force underlying all relative forces, but which conscious thought cannot interpret and use directly in its process of evolution, and can go only to what has transpired in experience and find there what the invariable order has been, and take that for the satisfactory exposition of what it ever will be. "To this an ultimate analysis brings us down; and from this a *rational* synthesis must build up." We emphasize in this quotation the word "rational," inasmuch as it may seem to promise what is by no means fulfilled. The truly rational way is, to subject the facts in experience to the insight of reason, to know what was requisite in this force that this order of fact should invariably have been thus; and only as the characteristics of the force have been so attained can the synthesis determined therefrom be properly termed rational.. But the cause is not at all studied in its effects, and the absolute is not read in what it has done, and is only known as persistent with utterly unknowable characteristics; and what only we can use as cause and law is the invariable grouping or succeeding in the facts of experience. It is but a conscious relative synthesis, not at all a rational synthesis, which may be clearly seen in the Absolute Causality, as essentially that from whence the relatives have come.

4. *A Discrimination of Misleading Ambiguities.*—Inasmuch as this substitution of the conscious for the rational will in various ways be henceforward continually occurring, doubtless the surest

and soonest way to a full and fair appreciation of this grade of evolution will be, to just here make a clear discrimination of the two, under several of the more prominent terms made common to both, and thus keep them full and ready in mind for application when the occasions may demand. We will put them as tersely as we can, and yet give them plainly.

Universal.—The highest signification is, the total of all possible being, and thus is *absolute* universality. Then lower is, the total of all actual being, which is universality *in fact*, and may have the further qualifications of past, present, and future. Then lower still, we may take consciousness in its two relations of co-resistance by the muscular pressure or by the objective repression, and if the former only is taken as making up the conscious realities, the universal will be in *subjective thought;* while if the latter is taken as constituent of consciousness, the universal will be of the *objective existences;* and this last is the universal in the evolution of mechanical forces. It excludes by ignoring all ultimate truths in reason, and all relatives in consciousness but those of matter, motion, and their places and periods.

Substance.—The broadest meaning is, the support that stands under universal being, and as such is the *absolute ground* of all existence; and in particularity it is *ground for each individual* existence; and in both cases the knowledge of the substance is of the reason only. In consciousness, the groups of relatives, invariably similar in their collocation, unavoidably induce the notion of a whole, as holding altogether; and such notion of totality holding the parts together is known as the *body*, or substance of the object. It is because the human sense is illumined by the endowment of reason that it acquires such semblance of an underlying substance, where otherwise there would be in consciousness an aggregation of particulars only; and the mechanical evolution takes such consciously assumed body as atomistic, and with each atom in itself impenetrable and extended, and that all change comes by varied composition in place or period. Its chemical combinations are necessarily external agglutination and not internal concretion.

Cause.—In the highest meaning, it is the energy that works all change and holds in order all succession, and is *absolute* *cause;* while in particulars it works the changes and connects them in orderly successions in each individual, and is thus *particular source* of the series; and in each case it is the attainment of reason only. In the lower sphere of consciousness, the relative realities are perceived and thought in irreversible successions, and the human mind, prompted by its natively endowed reason, deems the order of succession unavoidable; but with no recognition of reason as a distinctive faculty, the whole series in consciousness is used as resting only in its empirical order, with no higher authority for its validity than that thus it has ever occurred. The former, a rational cause, is the sure basis for science, and yet a basis it would be absurd to suppose that science itself could inductively establish, since it must first stand on this to establish any thing. The latter, or relative cause, is known only in its time relations, and though deemed certain in its order, there is no recognized ground for the conviction that it might not as well have been otherwise. All efficiency is lost sight of in the want of rational acknowledgment; and this last sort of causation is that alone which the evolution here considered can apply.

Law.—This has also the like equivocal significations. In its rational import, it has ever a constraining executive in what is before the insight of reason only. Such constraint bears directly upon the end of fulfilment, either as coercion or as penalty. But in a lower sense, the law is just the invariable order that has been found in consciousness. It has already been executed, but in what way, or for what reason, there is no inquiry; for no importance belongs to it. It has ever been thus; it is deemed sure that it will ever be thus; and this steadfast order is law, with no regard to the spirit of its execution. The Absolute Force has been cause, as direct antecedent of all relative development; but there is no opportunity to know of any design, intent, or ultimate end to be attained, and the fact of order stands itself as the only known law of order the consciousness can communicate. And the bare fact that evolution everywhere goes from the indefinite homogeneity to the definite heterogeneity is the law of the evolution, and there can be no interpretation of its executive character in its essential energy and end, save only that its relative realities of impenetrability and extension are universal and unalterable, and the order of their movement irreversible.

Beginning.—In its largest acceptation, this signifies the primitive fiat of the Absolute Reason, inclusive of both the outgoing energy and its stand-fast as an overt existence, to each of which, as distinguished in thought, the term "beginning" in its largest meaning is applicable. The same acceptation, in its restricted sphere, is true of any origination of the finite reason, which is as truly a beginning as the primitive fiat of the absolute, and its fixed expression in some old material is as validly a new form in existence as is the absolute product. The genius of reason, absolute or finite, is ever originally creative, and makes a literal beginning. A less significance is held by the term when applied to an arbitrary or a casual taking of any point in an empirical succession, and making from it the starting of a process. And this admits of a beginning in two distinct senses, as when we take the point in a progressive mental process, like abstract counting; or in an ongoing objective series, like the clicking telegraph: the former, beginning from the mental number, a spontaneous thought-process; the latter, beginning from the one click, a conscious objective experience. Of this last meaning only is the use of the term in the evolution of mechanical force. The material movement is taken as without beginning or ending, and some arbitrary instant is assumed for the evolving movement to start.

Evolution.—This term is applicable to our whole theme of investigation in its distinctive varieties; and we here note, that our stand-point must be in experience, yet that this experience is not, and cannot be, that of the absolute in its evolving energy, but that only of conscious recipients of the exhibition, and as studying the development of the manifestation by the measure of intelligence which we have the capability of applying to it. It is a human knowledge of the absolute development which we seek and hope to gain; and in our Introduction it has been already said, that all theories of evolution necessarily and exclusively find each its respective source in the mode of psychologically ordering the process for perceiving, thinking, and knowing, and which we have assumed will admit of three, and only three, divisions. We here discriminate them in the essential significance of each, that we may exclude mistakes quite liable to occur from the confusion and perplexity incident to their ambiguity.

The *first*, and fullest of meaning, takes all of conscious sensation and reflection, on both the sides of mental activity and objective impression, into the comprehensive contemplation of the reason, and by forecasting from them what antecedently to them was clearly necessary for them to be as experience has found them, the source and order of their evolution is rationally and convincingly expounded. The *second* is inferior and of weaker significance, taking that side of the consciousness only which is active in sense-cognition, and carrying the thinking process completely out, in the internal and external development of all that belongs to self-conscious empirical thought, to its universal totality. We design subsequently to give full and fair investigation to both these theories in their reverse order of consideration. The *third*, and lowest, is the theory now in hand, which takes only the objective side of sensation, passing by not only the insight of reason, but also the spontaneous relative reaction of sense against the impressions made by incoming forces; and so controlling all observation and reflection solely by the essential elements of matter and motion, as they are given in the extended and impenetrable atoms by which all body and being in human experience are compounded and characterized. The matter is essentially in distinct and definite atoms, hard and inert in themselves, and each having its own respective place and period and movement, and acting its own part in the modification of the body it helps to constitute. Motion, also, is a conception almost as separate from the matter as are the atoms each from each. The atom and the motion have their place and time together, but the movement has its distinctive relations, characteristics, and consequences; and its modes of operation are as varied one with another as with the atoms. One mode of motion is the precursor of heat, another of sound, etc.; and the conversion of one mode into another in the same atom is at once an introduction of a new series of antecedents and consequents. All change is, in fact, the consequent upon the place and period of the atom, and the mode of its motion; and this mode of motion is also not merely the sign and measure, but the bearer and the executor of the atomic force.

When, then, we think out our process of evolution, we must do it through the media of atoms and motions, which are to be the connective antecedents and consequents all along the development. Where we can step on these as present relative realities, or as transferred from earlier invariable experiences to other realities which can be relative to them in impressions only upon one or two senses, the standing is considered firm, and the process valid. One thing comes out of another when traced through those media, and the rule for the induction is, to make the connections very carefully, and after close observation; and yet we shall find the case to be, that the media are frequently so faint, so few, so thin, that we are often obliged to walk upon scientific imaginings, and in very many cases of seeming evolution can find nothing to confirm such conviction.

5. *Some Points through which this Grade of Evolution cannot pass.*—We now know just what this evolution is, and what relative realities it needs for its outcome, and may thus in thought take a regressus over past experience, and find if there must have been some impassable chasms. We now run back the empirical course in discovery. The Absolute Force is persistent, with no beginning nor end; but the evolution for our experience must begin at some point of its causality, beyond which we cannot reach by any regressus. We pass up, in analytic thought, to the naked, separate atoms in their inertia. What preceded is as nothing for our evolving thought. It may have been a precedent dissolving or disintegrating process, bringing the atoms to their state of individualization, and so up in cycling alternation of dissolution and evolution interminably; but our earliest possible stand is among the single, hard atoms in mass, as a nebula of disintegrated matter in its inertia. Each particle of this primitive dust has its extension, its impenetrability, its gravity, its inertia; yet is it the rest of exact equilibration: and here our evolving process must start to bring the first event out in empirical manifestation. Clearly, from the experience carried back, that prime event must be a movement; and yet no conscious motion of inert matter has ever occurred in all human experience. Unless we can go back of the

moveless atoms, and get the persistent absolute to lift up and let fall some one atom in its gravity, our evolution is as motionless as the inert mass about us. There must be some outside help for *the beginning*.

Even if so released from this bondage of universal stagnation by such outside help, we can follow up our evolution but a little way: this falling atom will strike and collide with others, in its centripetal course determined by the reciprocity of each in gravitating toward all others, and thus awake an expansive heat-force to just its own amount of gravitating motion, and which must make an oscillating rhythm to and fro, through all the mass, in the ratio of motion to the mass, but which can evolve no more nor other movement at any returning swing. We must wait again for any further evolution till the outside absolute give the oscillating movement a revolving turn, and then all, from centre to periphery, may 'be in rotating motion, in just the direction and to just the rate the absolute has determined for us; when exactly according to the law of evolution, so given, we may readily, in thought, pass along down the changes from indefinite similarity to definite variety, through the breaking-up and rearranging evolutions, till systems and worlds and geologic and geographic forms are brought out in their integrity. Evolution may in this way pass through cohesion, chemical combination, and crystalline formation; but all as molecular collocation only.

And then we come to *a chasm before entering the vegetable kingdom.* Plant-life differs from mere mechanism in that it diffuses itself through the organic structure, and makes the parts indivisible, and thereby the whole becomes an *individual.* Each part needs the whole, and the whole needs the parts; and the life-energy filling in this want binds all parts by common sympathy into the one individual. A fractured crystal has its want of integrity only as felt in us, but a wilting plant makes its want to be felt by us as within itself, and obliges us to feel sympathetic toward it. The plant has, and keeps, the mechanical forces in all its parts; but, superinduced upon the force, there has been an energy urging to the end of the want, and it is this spontaneous energizing which has possessed the force, and used it for its own interest and end, that has thereby brought the forces in sympathetic and individual unity. So superinduced and working on and in its possessed force, the combined force and urgent want constitute that distinct existence unlike to any mechanical force, which alone can fill and guide the thought in following out any consistent evolution in living organisms.

Beyond this conviction of a spontaneous life-energy that unavoidably gets within experience from common observation, there is the further confirming of the conviction by scientific arrangement and microscopic investigation. By a prepared solution, the very point where the life-energy is at work may be brought under most minute and clear inspection. The life-cell, common to all forms of organic existence, is thus known as having in connection its precedent *nutriment*, and its consequent produced *tissue*, while all the moving action goes on in the *cell-fluid* only. Herein is perpetual movement, starting from diverse and varying points quite independently of each other, and passing through and over each other, with or against gravity, from which there comes out the completed tissue environing the cell, and continually dividing and augmenting. What was carbon, oxygen, hydrogen, and varying with nitrogen, in the nutriment, and which, in mechanical chemistry, could have only binary combinations, has here in the life-cell been wrought into tissue of ternary and quaternary combination. No mechanical chemistry has ever made living tissue; but the life may depart without a return, yet will the old constituent forces survive in the dead remnant. The nutriment and the tissue can be chemically analyzed, but the living cell can only be seen moving, since any subjection to analysis would leave only the dead product. The tissue lives in its constituted organism, successively exhaled and renewed. Thus from common and scientific observations come out the same unavoidable convictions, that matter has impulsive forces only, while living matter has and keeps the impulses, and yet, over and above them, has spontaneous energies urging the material forces out in its own interests and uses.

And here comes the dilemma for this grade of evolution. The facts constrain the conviction of a present energy overworking and ruling the forces, and hence not an evolution from the forces. But evolution in consciousness has no recognition of an absolute, except when brought as a relative under the law of consciousness; and hence the evolving must cease, or pass on only in suppositions and scientific imaginations and presumptions. It takes this latter alternative, and finding the elements of the nutriment in solution facile for organic construction—having among them the extremes of cohesiveness and volatility—it presumes that some way may be found whereby the mechanical forces, in their action and reaction, may build up the organic structure. This has not yet appeared in any experience, and the fact is put, just as experience has attained it, as the definition of the reality, viz., that *life is the continual adjustment of the internal relations to their environment;* just as the candle-flame perpetuates its adjustment to its environment so long as the carbon and hydrogen in the tallow and the supplied oxygen from the air feed the combustion. Experience sees the relative realities in the flame, and trusts, in time to come, to find them in the living adjustment as well, and so presumptively holds the mechanical evolution to be going forward. No matter what might be found as ultimate fact, it could not give the adequate efficient, nor help the evolution over the chasm to the living energy which is alone the sufficient reason.

The still broader distinctions between force and *animal life* are yet further convincing. The control and use of force is here in a new realm, and within another and higher jurisdiction. It is not merely for the relief of want, but the gratification of sentient consciousness. The organism is to be constructed to the end of happiness, and the spontaneity which is instinctively to build it must be proportionally exalted. The structure must be fitted to its end, and then the nervous arrangement fitted into it, as the finishing work of the living agent; and as the organism is to be more complicated and nicely executed, so that which is to be accomplished in and by it must be above all mechanism and all plant utilities. There will be the special sense-organs and their varied perceptions; the retained representatives of the perceptions in memory, and the reflective thought to which they give occasion; the inner sentient sympathies, appetites, and accompanying desires and emotions attending sensation and thought; and all these consciously in possession, abundantly manifesting that plant-life can neither construct nor use the animal organism, and so much the more preposterous must it be to suppose that material elementary atoms, by transposition and some supposed actions and reactions promiscuously among themselves, can work up this organism and agency, and yet the whole be truly nothing other than nicely and mysteriously driven machinery. The same mechanical forces, it is true, are in a living organism as in lifeless mechanism, and they remain in some form still when the life is taken from them; but only while the life possesses them do the organic perceptions and remembrances remain in or come from them, and thus must it be that the living and not the lifeless should have the credit of them.

The dilemma is then more sharp-horned than before, and the necessity is the greater that the evolution which is to pass from the vegetable to the animal kingdom must find some more adequate efficiency and sufficient reason for its support and guidance than the supposition of some imagined relations which as yet no conscious experience has ever realized. The sunlight may be claimed as the source of all living activity and conscious thought and emotion, but only because of the mystery of its subtle agency; for no scientific study of optical phenomena under physical laws has ever found any approach to a clearly thought-out process, how the rapid vibrations of light from the sun can have any other connection in the evolving of vital action than in the modification of the forces used, and not in any urgency on the prompting spontaneity. The living tissue for the organic sense is the product of the living activity, and the living agency constructing is also the sentient agent using; and the perception and thought and emotion are the conscious possessions of this agent, and therefore the forces used in construction and execution can have only the rightful credit of having been fit and facile instruments in the result. To suppose otherwise is but the mistaking of distinctions in kind for mere distinctions in degree, and so far delusive and deceptive.

We shall have no occasion here to pass beyond life in the animal realm over the chasm between it and *human experience;* for the psychology in mechanical evolution admits of nothing different in kind for the human that is not also in the animal experience. But it is well, just here, to disclose an absurdity to which we have been brought by the delusive process of the evolution itself. In the analysis of the causes of evolution, we noted that the resistance on the side of muscular pressure was passed by, and that the objective resistance to this pressure was taken, and it has been this force "not in our consciousness," and admitted not to be "force as we know it," of which we have been all along watching the development. We now find it to have eventuated in animal life and sensation, and that verily the rejected, unlike, conscious force of muscular pressure has come back to us out of its opposite correlative. This spontaneous muscular tension in the sense-organs, and the antecedent in all locomotion, may then prove itself to be a true psychical force, quite distinct from all mechanical physics; at least, though illusively attained, it cannot be now claimed as like the mechanical persistent force which has, all along the evolving process, been physically disintegrating and rearranging the hard material atoms.

We further adduce the equally unsatisfactory process of this grade of evolution for organic *genesis and heredity.* Genesis is the multiplication of individual organisms, and heredity is their ancestral likeness. In lower organic types there are varied modes of propagation without sex-distinctions, but in higher organisms the genesis is through sex-relations. A germ-cell is fertilized by a sperm-cell, and the product is a new individual. This is repeated in each genesis, and with the perpetual tendency of like to beget like, yet with variations distinguishing each individual from all others. Peculiarities of ancestry, also, at times reappear after an intervening parentage of one or more generations, and which likenesses are known as cases of atavism. In vegetable genesis, the descent is by a bare seed or by fruit with the seed in it; and in animal generation the descent is either oviparous or viviparous, and in all cases the organic construction is in the one invariable process of a previously supplied nutriment, a living activity in the fluid cell, and a completed product in living tissue. All organic growth and preservation is only in this one way; the living spontaneity constructs from the lifeless nutriment the finished living tissue, and the tissue is continually augmented in the persistent process, expanding and shaping into fibre that dies and is eliminated, and replaced by new products. This living action may be subjected to close microscopic observation in its phenomenal movement, and thereby known to differ in its facts from all empirical manifestation of mechanical forces, in that it works against them, overrules and controls them, and uses them beyond their own normal compositions and chemical combinations. The instinctive life-agency is the alone sufficient reason for an evolution of the facts belonging to genesis and heredity.

But the psychology of consciousness recognizes no such agency, and of course cannot get any of its connection and consistency of thought into its grade of evolution. The process is supposed, yet never verified, to be by a peculiar disintegration of the material elements and a rearrangement of them into new compounds. The more primitively original the operation, so much the more sublimated must be the units of force to accomplish it. Molecular motion, like the light vibration with its possible sequences, is supposed; and while no thought can trace it out, there is the presumption that the organic facts have followed from it, and the trust that some future induction may find the last fact which is to interpret all others. But even could that ultimate fact be found, it would still need an adequate support for it and all behind it. By itself, it could vindicate for its valid possession no intrinsic *what*, or *where*, or *when*, of its own that it might claim; and so what stability could there be to evolution that must come out from nescience?

In tracing the presentation of this theory of evolution, we now come, after some disparaging remarks of the hypothesis of a special creation, which are not pleasant reading to a theistic believer, to the consideration of its closing labor, in the application of what has been gained to the confirmation of mechanical evolution.

6. *The Evidences for Evolution.*—Modern physical science, with much diligence and success, has prosecuted its work in its own province of collecting and arranging the astronomic, geologic, and organic facts, which observation and experiment can discover in the primitive nebula, and down through all the

intervening events of the long Azoic, Protozoic, Palæozoic, Mesozoic, Neozoic eras, to our own post-tertiary period. All this enables us to take gratefully what they have gained and use it philosophically, with as much encouragement and authority as the physicist himself. Such use we propose afterwards to make, but our present task is to follow his philosophizing, and find what he is trying to teach us, by turning conscious relative realities to do the work of philosophic rational efficiences. How evince that all inorganic and organic being has come from the inertia of his impenetrable molecules? We have traced his process of evolution; we now come to estimate his proofs.

(1) *From Classification.*—By the facts found it has also been found that former attempts to arrange them lineally, as on a string, are quite impracticable; and that they must some way represent themselves as group within group, from some originating point. To do this most effectually, demands the diagraphic form of a solid that, of course, cannot be used on the superficial page. The best practical way is thus taken to be the use of the form of a branching genealogical tree: classified inorganic facts taken as the ground, and the rising classified organic facts constituting the trunk and branches. Directly from the material ground springs the vegetable life, and but just above branches an equal stock as animal life, and each sends off its sub-kingdoms in their diminishing proportions of classes, orders, genera, and species. The two kingdoms have root in the same soil; the intertwined branches spread out their multiplying extremities to constitute a complete periphery; and all appear as an evolution from one source. And this is the more probable from the added evolutionary characteristics, that the oldest and broadest distinctions are essentially structural and natively peculiar; that the distinctions are variable, with general uniformity only and much particular variety; and that from this is the evidence that the older and more compact were once more indefinitely simple. But, though all is as if it were an evolution, and that it is easily supposable the molecular vibrations, and polarities, and rhythmic reactions of matter have exactly conspired among themselves in the introduction of just those regulated events, yet can no

thought accurately trace them to their determinate source. Classification at best indicates, but never demonstrates, an evolutionary process.

And the connected analogical illustration shows clearly, though all unwittingly, that there has been an instinctive prompting towards the true source. The Scandinavian races—Norwegian, Swede, Dane, German, Dutch, and Anglo-Saxon—slightly diverge; the Celtic Welshman, Irishman, and Scotch Highlander differentiate more widely among themselves, and in mass still more widely, from the Scandinavian mass; and the Latin nations are still an older and more unlike offshoot; and then the Eastern variety of the old stock is yet wider apart from its European kindred. And then, also, from the Aryan stock, as above, is a much older and broader distinction in the Mongolian stock; and again in the Nigritian. Thus ethnologically there is group within group of widening import, as we recede from the more modern distinctions, and which are indicative though not demonstrative of their evolution. On the other hand, it is said of language, that we know it to have arisen by evolution; and as it, and the nationalities using it, have the like evolutionary characteristics, the conclusion is, that the national differentiations are also evolutionary. But how know we that language has come in by evolution? The empirical evidences for the linguistic relations are no more direct or clear than for the ethnologic relations. The rational human endowment lies under all the linguistic facts and their differentiations, and we know this to be adequately efficient for the speech, and for all its variations according to circumstances; hence we know the linguistic evolution. We follow it out directly from its sufficient reason, and therein find the occasions for its origin and for all its older and its later changes. We go directly to its source and trace, in thought, the rational efficient, passing out and determining all the variations and connections of the human modes in linguistic communication. There is also, in all human genesis, an instinctive energy back of the human organism, which has modelled the body and its members according to its own spontaneous urgency; and by it all the families and nations of mankind have been born with organs of speech, and rational powers for inventing language, and shaping its grammatical and idiomatic changes for its own best convenience. We may go direct to reason for the evolution of the nations themselves, as well as for the source of their speech.

(2) *From Embryology.*—Exact observation has found that in the genesis of organisms, passing out from vegetable reproductions, in animal life there is this general order of embryotic growth, viz., that the earlier stage of each distinctive type of completed organism is conformable in attributes and structural character to the early stage of all, and that later stages have their conformities with other organisms only in cases wherein their characteristics are inferior to its own full type, and so onwards dropping comparative comformities as its own full type runs out beyond others, till at length the highest organic type ceases from all conformity in its highest traits, and has only its lower attributes in common with any. Such embryologic order gives occasion for constructing a representative embryologic tree, as before in the facts of classification we had a genealogical tree. The first division would pass out of conformity with cell-life in plants, and begin in common animal conformity with muscular tissue and nerve irritability, and so failing in conformity where its attributes were superior, till at length some one species would stand unconformable in its highest type without a compeer, at least in degree, if not in kind. Such imaginary tree would be a strong index of universal evolution, as if all had grown in complete conical form with man at the apex, and he one with all, but as the crowning genesis.

But these embryonic gradations are not, in the facts, very sharply cut, having indefinite outlines, and at places showing broad gaps, and yet these incomplete conformities are alleged as confirmative of evolution, since environing hindrances should be expected to modify, and ancestral peculiarities sometimes largely to change, genetic construction. And even beyond this, substitutions and suppressions of some particular organic members occur, which is but in the manner of evolution itself, where new ways of life may get new members or lose old ones through interfering heredity. Embryology is thus strongly indicative of evolution, though no complete demonstration can be gained by conscious relative realities. The embryonic life and growth are as if from one source, and molecular motion and subtle reaction are readily supposed competent to introduce the changes, and occasion the conformities or their deficiencies, though unable to furnish clear traces for the thought to follow the experience to the one primitive source.

An analogy is then given in illustration, as was before done in classification, wherein the example is taken as known evolution. A single worker makes and sells his own wares. He prospers, and employs others to work, and he only sells. Further prosperity makes his factory the channel for wider associative labor, and he has fixed employment for fixed workers, and in division of labor and laborers he gathers a large community of varied operatives. These become accustomed to the business, the communal regulations, and the social requisitions; and his growing success enables the manufacturer to start new establishments in other places, and open new enterprises in foreign lands at once, without the necessity for the slow process of the opening business. This last is manifestly an evolution, and its analogy to the embryotic accumulation may be taken in proof for its evolution.

But here we ask again, how know we the business enterprise to be evolution? We might study its empirical details and note its conscious relatives never so much, but this would never reveal the clear thought whence and how has come this prosperous establishment, till we could see in the conscious detailed operations the one organizing energy that originated and ordered them. And so, when we shall get the clear thought of embryotic evolution, it will never have come from any suppositions of molecular polarities or vibratory forces, nor by any direct or indirect empirical transformations, but only when in the embryotic facts we read clearly the presence of the spontaneous energy that was requisite to make and manage these facts in all their originations and graded superinductions. The evolution is not consciously relative, but necessarily thoroughly instinctive.

(3) *From Morphology.*—The completed structure of some entire classes of animal organisms is upon one general plan, in some cases more obscure, yet in all so manifest as to be very remarkable. The multiplied forms and varied habits of the

entire insect class have their construction in the different collections of twenty segments as their primary constituents. The *Crustacea* have also the like number of twenty segments, but in the higher orders their joined seams are often obscure. The same animal, again, has often great similarity of parts in its structure. Serpents have similar short vertebræ, giving flexibility to the entire body. Birds and mammals have the body inflexible, as a basis for their locomotive members, but yet a composition of many vertebrate portions, joined in firmness differently for their varied structures. In the embryotic growth the vertebral column is continuous at first, and then divided in segments, which join in their respective ways to constitute their structural support. Some have the segments proportionally distributed, as in the *Crustacea;* a larger number to form a complicated mouth, and then a less number used for feet and legs. So in plants, sepals, petals, and stamens in the flower are transformed leaves in a spire. Sometimes digits with complete phalanges, and then another with arrested growth of phalanges. Adult organisms not very infrequently have useless rudimentary organs which in other animals are useful; and sometimes there is the forecasting of a useful organ, needless here, but an index of a coming want in a higher order, as the teeth in some birds' beaks, or in the whale fœtus.

Surely such process according to plan, and such suppressions and anticipations, indicate evolution, development from some original; but they just as surely exclude this grade of evolution. How can mechanical movement indicate plan but just as fact found? And how is fact found, of so broad a law for evolution as to include all that passes from "indefinite homogeneity to definite heterogeneity," to guide the thought to any adequate source for expounding the use of the twenty segments in all insects and crustacea? or how expound the transformations, superpositions, and anticipations? There may be suppositions more or less plausible of the action and reaction of mechanical forces, but never an attainment of efficient causes. The only sufficient reason possible to be adduced is the rational insight of reason that there is at work a spontaneous agency. The *Spiritus intus alit;* the inworking energy which, back of the facts, is rationally known to be essential for the facts—this only is the true and safe interpreter and sufficient reason. And in this all the evolving is satisfactorily convincing.

(4) *From Distribution.*—Organisms spread abroad, and perpetually tend to propagate themselves in new places and amid a changed environment, and are thus under continual liabilities to variation. The normal result would be an increasing adaptation of organism to environment from natural selection; but the fact as frequently found is, that within quite narrow geographical limits there are non-conforming organisms, and again at wide distances organisms nearly allied; but in the former case the obstacles to distribution are found to be great, and in the latter case facilities for it are open. These facts are assumed to preclude all notion of design, but are also at first view unfavorable for evolution, and the effort is rather to obviate objection than to supply evidence.

If all present existences have been evolved from primitive indefinite simplicity, it would seem most likely that the land and air have been supplied with their organisms from the water, which would require that a fish should have desired, or been forced, to leave his proper element, and walk on land or fly in air, and in long generations to have acquired conforming variations for either or both; but how should the fish subsist in the interval? This is thus explained: *Amphibia* have two modes of oxygenation, pulmonic and brachial, and use either with longer or shorter periods of change, and some animals live through a long drought on land that might also have as long survived under water. Constant opportunity for ready changes either way would, in due time, make the dwellers of the sea also inhabitants of the land or the air, and so constitute perpetual commerce between them, or as occasion guided, they took fixed abodes and perpetuated fixed habits in their generations; and so evolution, it is said, has had its open way, and alone fairly accounts for universal organic distributions in *space.*

Distribution in *time* has its peculiar obscurities. Geological records are very incomplete, and the fragmentary evidences difficult to gather; and the only safe conviction yet attained is, that a theory of progressive modifications must consist with indefinitely long periods, in which there was no progress. This general fact is, however, put down as strongly encouraging evolution, viz., that the organisms of the last formed strata are nearly conformed to the present, and those in earlier strata have their proportionally less percentage in conformity; and so, on the whole, indicating descent of present life from past life. This holds true in large regions, so that over whole continents there has been a kinship between the fossil remains and the living animals and plants.

Evolution is thus made to account for the facts of distribution of organisms both in space and time, but it is quite easy to be clearly shown that it cannot be this stage of evolution now under consideration. It has no adequate executive, and as we have all along found, if we rely on this mechanical evolution from consciousness, it will supply nothing but suppositions and illusions. The treatment of this present evidence from distribution is a characteristic exhibition. Let us go back to the two media of land and water, and stand between them before the fish had been evolved, and what could the mechanical forces avail in evolving the *Amphibia?* They use the living spontaneity already given, to differentiate the life instinct from brachial to pulmonic construction, and can else avail nothing. Put the evolution with water and earth alone, to make their transformations to fish in water, bird in air, beast on land, or amphibia in either, and how shall mechanic forces put out instinctive life anywhere? Suppositions of heat, light, polarities, vibrations, working among material molecules, can never give consistent thought from material inertia to living spontaneity. Evolutionary law is mere fact of order; life is mere fact of adjustment of inner and outer; the executive is supposed without thought in both; of course, the evolution cannot evolve. It has nothing in; how then should events come out?

We here close our review of the systematic representation given of the mechanical theory of evolution. There is an important modification which is frequently taken as an adjunct to it, in the way of expounding the descent of Man, and which is given in its own distinctive process of evolution relative to the genetic reproduction of animal life. It is quite desirable here to notice it, but the space generously allotted us is so nearly filled that we put what we have to say of it in the shortest possible compass.

The Evolution by Selection.—The evolution of the inorganic world is not touched, nor is its passage from the inorganic to the organic at all regarded, nor is the evolution of the vegetable kingdom made other than partially applicable; but a very broad induction of facts is made from the animal kingdom, and made in its own peculiar way to bear upon the exposition of the genesis of man. Embryologic, morphologic, and physiologic facts, especially from among the vertebrata, have been sought out with great diligence and sharp observation. There is a distinct recognition of a living energy that overrules and uses matter in its mechanical forces, and this instinctive agency is made both evidential and causal for its peculiar mode of evolution. This life-instinct has its intrinsic energies in various secret structures that can be known only as they manifest themselves in the organisms successively generated, and which imperceptibly in any one generation, but in long eras, do grow out in higher forms and better habits of existence. The similarity of embryonic development between man and the lower animals, and innumerable rudimental points of structure and constitution perpetually reappearing in man from the lower classes, are made the alleged unmistakable grounds of evidence that man has been evolved from the lower orders of animal organization. The marks readily guide the imagination in tracing back man's descent; which in his primitive humanity must have been from an ancestor that was a hairy quadruped, which naturalists would class with the quadrumana, and who with all the higher mammals was again a descendant from an ancient marsupial, and thence back in a long line of diverse forms to a reptile or amphibian, and this again from some fish-like animal. Since this human development, mankind have been so widely divided in races, that their extremes might be accounted distinct species; yet their deeper constitutional attributes, which are in common to all, make it more appropriate to count man as of one species. In the animal line of descent one law is universally prevalent—that like begets like. There is also a converse law, clear in general but obscure in details, that each descendant shall have its variations and make all from each distinguishable. The modifications are from outer environment, but more significantly from heredity and constitutional construction that evolves peculiarities in differentiations, which though under law are as yet inexplicable. Careful inductions from all these changes, under the steady law of descent, must interpret the rising process of evolution through all animal generation:

1. *By Sexual Selection.*—Wide observation of animal reproduction finds everywhere a fierce perpetual struggle, usually among the males, either to dispose of rivals on one hand, or to win the female's favor on the other; and this struggle naturally eventuates in a selection of the most fit progenitors for begetting the best posterity. The strongest and bravest male will overcome his inferior rivals, and this superiority will win for his choice the best partner. The theory supposes that the conflict and struggle exciting the instinctive life energy has availed in giving the males, through long generations, their hardihood, strength, adornment, and armor offensive and defensive, and indeed almost all their secondary differentiations from the females; but this consideration comes better to view hereafter.

We need here only notice the distinction of the application of the law of descent, between sex-selection and other methods of pairing the progenitors. Bird-fanciers, fish and cattle breeders, make selections and cross varieties, and sometimes pair nearly allied species and attain a hybrid genesis, in some instances securing an offspring quite conformed to a before designed pattern; but none of these changes or meliorations of race and improvement of breed should be used in analogy with sex-selection. There is here the application of experience and skill, and artificially adapting and constraining sex-inclinations within the known law of descent; and whatever may be the resulting changes, the tendency is at once to lapse toward old normal states when the pairing is again left to unchecked sex-selection.

2. *Natural Selection.*—The former division was natural, but with the nature of sex-relations; this is inclusive of every urgency within the highest of all, and operates through the highest passion of self-preservation. The strong-sex-struggle leads directly to over-production of descendants, and so to scarcity of nutriment and other supplies essential to life, and thus a struggle

for life itself ensues; the natural issue is a selection that secures "the survival of the fittest;" viz., the most fitting stock for the best generation.

Doubtless natural selection will conserve such as have the strongest hold on life; will it get the best parentage for reproduction? Plato, in his Republic, saw that marriage should be regulated for the highest ends of posterity, but he put its regulation in reason as a philosophic state administration, and not in natural selection. May not self-preservation and the strong urgency for reproduction sometimes come in conflict? Where, then, will natural selection take the development? But such queries are less radical than the direct inquiry, Can natural selection, under the law of descent, change specific constitution, and elevate animal life through ascending gradations? Sex-selection assumes that all secondary sex-distinctions arise under its control, and that the male offensive armature of horn and tusk and spur, with all the adorning of plumage and song and goodly form, which render him the more attractive to the female, as well as superior in rival contests, arise under the constant urgency of sex-instincts. But at the highest, the action of sex-selection is partial, arising out of but one passion, and therefore the predominant interest of self-preservation must include and govern, on the whole, all animal appetites and desires; and thus the inquiry, Can natural selection change structural constitution? will cover the whole ground. The sentient soul, as the whole animal life, controlling mechanical force, but itself not endowed with rational spirit, is here contemplated as the agent in natural selection; and the inquiry is, Can this be an adequate efficient for evolving itself from stage to stage, through all grades of animal organization?

This might require a long answer. To be sufficiently conclusive, it must have a longer discussion than we can here give; but quite a short statement can put the point in such light that a satisfactory reply must be much longer for its affirmation than will be necessary for its refutation. Embryonic growth is through stages, step by step diminishing the class of embryos it resembles, till the class of similar forms narrows to the species of which it is a member; and thus all embryos run over their past specific changes in getting up to the full integrity of the ancestral species. This is taken by the evolution of natural selection as an unmistakable evidence of continual specific ascent, though demanding for it long eras. In another point of light it will seem at least as unmistakable evidence for repeated superinduction and not of inter-continuance. For, so far as observation reaches, embryonic growth finds its integrity within the ancestral species, and never runs out into another. The specific type is in the instinctive life, and comes to its completeness in having passed its specific stages, and never transcends the ancestral species. The ancestry below has its embryo growths cease below, and that above has its embryo growths run on above; the mid-ancestry has its embryonic growths mature midway. What possible stronger inferential evidence that all are lifted step by step in some form of superinduction, and that each holds only what has been given? No matter what may be the modification of physiologic function, there is found no genealogic change of morphologic structure.

But may not natural selection take advantage of favorable occasional variations? On this is, doubtless, the main dependence; for the common admission is, that the law of descent limits elevation beyond the sum of excellency in both parents. To demand more would violate the law of like from like. This is, then, just as we argue; there must, from somewhere, come superinduction. From whence? that shall suffice to change specific constitution. From below, through any heredity? Certainly no lower ancestry can change higher structures, if he cannot change his own. Shall it be from some higher animal species? But how, when all were low, could any become high? It surely seems that no adequate efficiency to lift the whole can come of the whole, either at once or by instalments. From this standpoint we may be constrained to say, help can come only from One "wonderful in counsel, and excellent in working."

We truly have use here of a higher causality for evolution than force, but animal life will not very readily evolve itself from fish to quadruped, and through quadrumana up to man.

We stand back, then, on the only systematically elaborated theory of physical evolution, and, in conclusion, feel warranted to say, that the profound researches of modern physical science are to be gratefully welcomed; but that, confessedly, "the basis of inductive science is not within itself;" and when it takes a philosophy of conscious experience to expound its foundation, it at once finds itself in the midst of contradictions and absurdities. With it, all mind is matter; and the universe is a machine with neither maker nor manager. It excludes all immutable morality, and allows to man no rights that any are bound to respect. It is reasonable to reject the philosophy, and still further reasonable to pity the philosopher. The pious physicist can safely rest his faith on the Bible, but the Bible can get no help from his philosophy.

LAURENS P. HICKOK.

CONTEMPORARY PHILOSOPHY: MIND AND BRAIN.

IN the last number of this REVIEW I stated that philosophy is at this present time running strongly in two directions: one towards historical and critical discussions, and the other towards the physiology of the brain and nerves. Having pointed out the defects of an exclusively historical method, which may take us away from the observation of the operations of the human mind, I am now to follow the other and far more powerful stream, and inquire whither it is conducting our young men.

Physiological psychology is at present collecting around it a keen feeling of interest in Germany and in England. In the former we have Lotze, Wundt, and a host of others, physicians and metaphysicians. In England we have Carpenter and Bain, Maudsley and Ferrier, making observations and experiments; and Spencer constructing his bold but premature generalizations. The real fruit gathered is not yet a sufficient payment of the labor expended. Rash hypotheses have been formed by one man, to be taken down by his neighbor. A strong determination has been shown by not a few to account for all mental action by brain action. But out of the researches there will issue a record of important facts, which in due time may be co-ordinated into laws. This REVIEW cannot be employed in a more important work, in an age in which materialism is making such lofty pretensions, than in exposing and restraining rash speculations and expounding and encouraging real discoveries.

Within the last few years we have had two excellent works published in Britain on the relation of brain to mind.

Carpenter's "Mental Physiology." — This is a very interesting work, full of information collected from a variety of

Evolution:

Mechanical

God over the face of modern society as He is once said to have moved over "the face of the waters," the life-work of Frederick Maurice finds its true expression and consummation.

Julius H. Ward.

MECHANICAL EVOLUTION.

Andover Review.

I believe in man, therefore I believe in God. This is the fundamental article of natural religion. Whatever our theory of the origin and ancestry of man may be, natural theism requires the belief that he *is*, and that he is a self-determining power.

There is a phase of thought bearing the name "evolution" which cannot by any possibility be reconciled with religion. It is subversive not only of theology, but equally of every high belief. In it the world is conceived of as having behind it not an intelligent will, but only a mindless energy. All things are what they are by necessity. Each term in the vast series of existences has been forced into being by those that have preceded it. Nothing that has taken place could have been in the slightest degree different from what it has been or is. Man, the most highly-evolved product, has become possessed of reflective intelligence; but this, his distinguishing characteristic, is the source of illusions which make him not the wisest thing, but only the most deceived thing that has existed. He is the most deceived not only in that he has inadequate ideas of the world that surrounds him, but essentially deceived in that, by the necessity that governs all things, he thinks of himself as the reverse, the absolute contradiction of what he is. He cannot help believing in himself as a cause, a responsible cause. He is, in fact, only a result that has come to pass by the impact of atoms acting and reacting upon each other through untold ages, without purpose and without intelligence.

I will not try to prove the position that this view of the universe is subversive of every high belief. If the statement does not carry conviction with it, there is some quality in the mental processes of the reader that no amount of argumentation is likely to influence. Mr. Herbert Spencer has recently given us his notion of the religion of the future, the motive power of which is to be the thought that we are "ever in the presence of an Infinite and Eternal Energy." This to some minds may stand for a high belief, and if so, it would probably be labor thrown away to try to prove that it is *not* high. The task which I have set before myself is, I hope, a more practicable one: namely, to demonstrate the unscientific character of Mr. Spencer's evolution. This, let me hasten to say, will not carry us into a refutation of his metaphysical "first principles," for the simple reason that these have and can have no vital connection with the *real* basis of his system.

A philosophy that destroys the reality of mind, by recognizing no permanent element in it, cannot indulge itself in metaphysics. If it is an "illusion" to suppose that "at each moment the ego is something more than the aggregate of feelings and ideas, actual and nascent, that then exists,"[1] anything like a trustworthy intuition or ultimate datum of consciousness is an impossibility. Such a supposed intuition is also an illusion. In saying this, I am not ruling out Mr. Spencer's agnosticism; for this, instead of being, as some of his admirers have claimed, an unessential part of his philosophy, is the necessary outcome of it. Spencerism is, in substance, the philosophy of Hume, illustrated and enforced by certain abstractions from modern science; and, as certainly as that philosophy, it leads to universal skepticism. What I do object to receiving, in such a connection, is that "datum of consciousness" which makes an "Incomprehensible Power," the "Absolute," a necessary object of thought. And with this must be excluded also all that metaphysical machinery, borrowed from Sir William Hamilton and Dean Mansel, to regulate and limit the too potent spirit which this datum of consciousness has called up. All this part of Mr. Spencer's system may be detached as easily as the dress of a masquerader. I therefore take the liberty of removing it and referring it for an answer to the many discussions, past, present, and future, of the views of the above mentioned writers.

What, then, is the real basis of Mr. Spencer's system? It is the doctrine of the persistence of force combined with an abstraction which he calls evolution. In his own words, "The phenomena of evolution have to be deduced from the persistence of force. To this an ultimate analysis brings us down; and on this a rational synthesis must build up."[2] A fuller expression of the same idea is as follows: "Given the persistence of force, and given the various derivative laws of force, and there has to be shown not only how the actual existences of the inorganic world necessarily exhibit the traits they do, but how there necessarily result the more numerous and involved traits exhibited by organic and super-organic existences — how an organism is evolved? what is the genesis of human intelligence? whence social progress arises?"[1]

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[1] *Principles of Psychology*, p. 500.

[2] *First Principles*, p. 398.

If a reader of the "Synthetic Philosophy" will continually bear in mind this position, it will very much reduce the seriousness of the dilemmas to which he finds himself shut up. Thus Mr. Spencer says, "Psychical changes either conform to law or they do not. If they do not conform to law, this work, in common with all other works on the subject, is sheer nonsense: no science of psychology is possible. If they do conform to law there cannot be any such thing as free will."[2] Now, as persistence of force is Mr. Spencer's ultimate law, what he really means is this: Psychical changes either conform to *mechanical* law or they do not; if they do not, this work is sheer nonsense. Mr. Spencer has assumed that the formulated laws of the lower and less complicated domain are sufficient for the explanation of the phenomena of the higher. His philosophy is an application of this assumption. But in making it he labors, not as we might have supposed he would, to show that his theory of evolution as applied to mind is justified by the facts of human consciousness, but, on the contrary, to show us what these facts ought to be in order to fit his construction of evolution. Practically, therefore, it is an attempt to educate men to disbelieve that which they naturally — we may say constitutionally — believe.

This radical revolution in our fundamental ideas is entered upon with a light heart by Mr. Spencer because he feels confident of his ability *so* to replace that which has been taken away that the thinking world will not object to the change, but will, on the contrary, be only too thankful to accept at his hands its old conceptions transfigured and inverted. It must be confessed that in this expectation he has not altogether miscalculated; for notwithstanding its lack of a philosophic or truly scientific basis, the "Synthetic Philosophy" has been elaborated with great skill. The parts are fitted with such adroitness that one seems to grow out of another as naturally as a branch grows from a tree. The course of thought is so diversified with abounding illustration, and so enriched with scientific detail and subordinate truths, that the reader who surrenders himself to its surface current may be carried along, as in a pleasantly moving dream, to conclusions that are at variance with his deepest convictions. There is a fascination in the seeming completeness and sufficiency of this scheme. It smooths away difficulties, explains the origin of things that had hitherto seemed mysterious; and, without any very well defined reason for so doing, preserves throughout an air of hopefulness and good cheer for the future.

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[1] *First Principles*, p. 555.

[2] *Principles of Psychology*, p. 503.

To a large class of readers, therefore, the "Synthetic Philosophy" has come as a timely and helpful straightening out of things that were crooked. Much of this sense of completeness must be conceded to the personal persuasiveness of the writer, but much also must be accorded to the underlying conception which pervades the whole. It is the evolutionary idea that binds one part to another and holds the reader as with a spell. Mr. Spencer seems to have rescued this idea from the loose, indeterminate forms in which it appears in connection with different classes of phenomena, and to have reduced it to laws as well defined as those of mechanics. By the universal application of these laws, all questions as to the origin of ideas, whether of things in heaven or things on earth, may be solved; and our notions of the nature of phenomena, hitherto conflicting and uncertain, may be rectified and fixed forever. It has been claimed by ardent adherents of Mr. Spencer, that in the realms of mental science and sociology he has done a work which is as great as that of Sir Isaac Newton in astronomy. Now, it may be asked, does not the fact that this form of evolution explains so much, that it seems to make a straight road where there used to be only a crooked path, constitute a strong presumption for its truth? I answer, it does not; because the facts which it does *not* explain, but which it traverses without compunction, are many and important.

It is Mr. Spencer who has laid down the law that "there is no mode of establishing the validity of any belief, except that of showing its entire congruity with all other beliefs."[1] It would be hard to hold the constructor of a system to a literal interpretation of this rule. But we are certainly interpreting according to the spirit and not according to the letter when we insist that a philosophy which reduces to "illusions" ideas that have hitherto been regarded as the unimpeachable data of consciousness shall give some better reason for its authority than that, having explained *many* facts, it is to be assumed that *all* facts are subject to it.

We are brought, therefore, to the critical examination of Mr. Spencer's idea of evolution; and I shall endeavor to show that scientific evolution is not responsible for this evolutionary idea; but that this latter is a purely fanciful thing, conceived by a speculative mind, eager to reduce to fixed and easily applied laws a theory which is, and which must be, for a long time to come, in the early stages of formation. As Professor Samuel Harris has well remarked, "Even if the theory of evolution is a grand insight of genius, it is not surprising, especially considering how recently it was announced, that it remains neither adequately formulated nor proved; and that only fragments which may ultimately find place in a comprehensive theory seem to be assuming the definiteness and certainty of scientific facts."

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[1] *First Principles*, p. 138.

It is unnecessary to multiply expressions of opinion with regard to that which speaks so clearly for itself. All the way along the course of evolution we have to recognize at intervals the introduction of new, active elements which complicate the problem, and make it impossible to formulate, except in a very imperfect way, the laws by which its ends are accomplished.

When we pass from the evolution of things without life to that of living forms in the vegetable world, we encounter the new and utterly mysterious factor of organic growth. As we rise in the scale we come to a further complication in the hitherto non-existing factor of sentience; farther on we come to consciousness and intelligence, and still farther on we come to self-conscious intelligence, and self-determining will in man. In our present state of knowledge each one of these new factors appears to be, in many respects, antagonistic to those before existing. They modify, and to some extent neutralize, the laws which it was possible to formulate for the explanation of the more simple and less evolved existences. An immense amount of patient scientific inquiry, therefore, into the particular problems of evolution as they exist in these widely separate, though related, realms of nature must be gone through with before any general, comprehensive law of evolution can be reached. "It is not," says Dr. Maudsley, "sound science to apply the known laws of the phenomena of the lower domain to an entire explanation of the phenomena of the higher domain; still less to beguile one's self into the belief of an explanation by the vague misapplication of the special terms of the former, which have definite meanings in their proper use and place, to the more complex phenomena of the latter, where they not only do not cover and fit the facts, but have their own exact significations blurred and defaced by the misuse."[1] In rejecting Mr. Spencer's conception, therefore, we are not rejecting the doctrine of evolution. We are only rejecting a fanciful and unscientific form of it, in order to prepare the way for a truer construction which shall be at the same time scientific and theistic.

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[1] *Body and Will*, p. 189.

The first position which I would assume as the basis of such a construction is, that a scientific application of evolution to mind can be made only by taking into account all the *facts* of mind which present themselves to us as ultimate data of consciousness. We must recognize at the outset two distinct departments of research, in each of which we come upon ultimate facts which can in no wise be invalidated. There is a subjective as well as an objective induction to be made. By the one we ascertain the facts of physical nature through sense-perception. By the other we ascertain the facts of mind-nature through self-consciousness. Deductions made from facts in the one realm cannot be used to override facts observed in the other. It is continually claimed by the representatives of natural science that they concern themselves only with facts that admit of verification. The claim is not well founded. In so far as they confine themselves simply to observing and recording that which exists and takes place in nature, their facts admit of verification. But they do much more than this. They reason about conceptions abstracted from these facts. Certain characteristics common to a group of facts are used to generalize from, and in this way they arrive at what are called "laws of nature." But these laws are abstractions which do not admit of verification. They may be proximately proved by convergence of evidence. But so long as the facts to which they are referred exhibit a side which is not only not included in the generalization, but which contradicts it, they must be regarded as imaginative conceptions, based upon one aspect of a many-sided reality. They are speculations without a reasonable foundation, because derived from a partial induction.[1]

I have said we must recognize *two* distinct departments of research, in each of which we come upon ultimate facts belonging to a different order. Taken by itself, this would be a crude and insufficient statement. As a fact, the universe of created things presents itself to us not as divided into compartments, separated from each other by hard and fast lines, but rather as a series or scale of modes of existence. These modes have each their own specific class of relations, which must be expressed in terms which have their special application, and which cannot be transferred to express relations of a different order. But it is at the same time true that all these modes of existence are linked together, so that each is seen to be closely related to that which is next higher and to that which is next lower. When we speak of two departments, therefore, we are simply contemplating the whole series from the opposite standpoints of its extreme limits, — on the one hand, from the extreme of inorganic nature, and on the other, from that of self-conscious mind. We do not have to travel all the way from inorganic existences to mind before we reach a point where mechanical laws are manifestly inadequate to express the relations of phenomena. As soon as we pass from the contemplation of the inorganic world to that of organized, living structures, facts are encountered which refuse to yield their secret to the key of a mechanical explanation. While there is an appearance of mechanism of a distinctive kind, there is also a very important something more.

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[1] Some of the most widely received generalizations of modern science, often referred to as "established laws of nature," are of this character. The atomo-mechanical theory, for instance, has been shown to be at variance with the fundamental laws of special sciences, — with those of chemistry, physics, and astronomy. For an able exposition of this fact, by one who writes purely in the interest of science, see "The Concepts and Theories of Modern Physics," by J. B. Stallo, International Scientific Series, vol. 38.

In every living organism there is an appearance of autonomy. There is an initiative and determinative power which seems to proceed from the structural unit itself. A single nucleated cell, under certain favorable conditions, sets to work to organize and elaborate itself. It does not simply multiply itself, but it exhibits a constructive ability which causes it to take certain forms having the most diverse characteristics and adapted to a great variety of functions. Now, in the contemplation of such phenomena our minds unconsciously reach about, not only for some words by which to designate the observed process, but also for a conception, borrowed from some other department of knowledge, which shall stand for a partial explanation of it. Every thinking man is perpetually striving after a unification of his knowledge; and what he calls an explanation is often little more than the noting of similarities between existences and processes, by which he is able to class the less known to some extent with the better known. Thus, when we seek for an explanation of the movements of the simplest forms of organized life, we have open to us two fields in which to search for similarities; for as these phenomena occupy an intermediate position between the extremes of mind and inorganic matter, we may reasonably expect to find analogies in both realms. We *ought* to search for them in both. But this is not what has most frequently happened. The acquisition of a two-sided conception does not satisfy that craving for a simplification of knowledge which is one of the most imperative wants of the human mind. We have therefore seen the thinking world divide itself into two opposed parties, each of which is inclined to look with obstinate preoccupation on one side of the shield.

Those who approach it from the side of the inorganic find abundant evidences of what looks like purely mechanical action, and advance to the position that mechanical law reigns supreme. Whatever is at variance with this conclusion they feel justified in neglecting on the ground that it constitutes only an *apparent* exception, which will ultimately be proved, as science advances, to be no exception. But those who approach the same phenomena from the side of the more highly organized find equally conclusive reasons for classing the simplest phenomena of organized life with the action of an intelligent mind. Having their thoughts fixed upon those activities which originate in the human mind, they demand a *cause* for that which they observe, which shall be something more than a sequence of phenomena, — a cause which can be expressed in terms of intelligence and will. These opposite tendencies flower, on the one hand, into systems like that of Mr. Spencer, and, on the other, into conceptions which are based upon the assumption of mind as the more or less immediate cause of every movement in nature. On the one hand, it is dogmatically affirmed that life is only transformed physical and chemical force; and, on the other, with better reason, that physical and chemical force are only *transformed* life or mind.

By the former party it is argued that the whole course of creation is a process proceeding from lower to higher forms, — from the inorganic to the organic; that the theory of evolution obliges us to look at the whole series of existences as pushed into being, each one by that next lower in the scale; that mind itself is a result of this process; and that the idea of originating cause which we connect with it must therefore be an illusion. Man, in common with the brute, the plant, and the stone, is the product of inexorable forces, of the nature of which he can have no knowledge, and over which he has no real, but only an imaginary control. On the other hand, those who refer all power to intelligent will have on their side the incontestable fact that mind is the sole originating cause of which we have any knowledge, and that in our experience of real causation the process is uniformly not from matter to mind, but from mind to matter. Those who assume cause to lie in the direction of the inorganic, and effect in the direction of the organic, have simply borrowed the idea of causation, which has originated in self-conscious mind, inverted it, and given it a purely imaginative application. It can also be said with truth that those who reduce everything to terms of mechanical force can never quite get away from the conception of intelligent causation. Their talk of molecules and atoms is meaningless without the accompanying conception that these have a certain individuality, and act as individuals act; and the admission of an "inscrutable power," an "incomprehensible cause," is in reality a reluctant concession to the idea of an intelligent, originating agent.

Now, while theism must hold to the truth of that interpretation of nature which takes its departure from the side of mind, it is not from a point of view so generalized and abstract that we can hope to ascertain the bearing of the doctrine of evolution on the phenomena of mind. Scientific evolution did not originate in a study of intuitions, any more than it did in the study of inorganic life. It was suggested by the observation of the processes of organic life. The successive stages of growth in the individual were seen to be, to some extent, expressive of the successive stages in organized life regarded as a whole. This afforded the clew from which the theory was formulated, and then reformulated, as the study of biology in all its branches threw additional light upon the problem. In making an application of evolution to the phenomena of mind, therefore, it is necessary for us to come back to the starting point from whence all the speculative applications of the doctrine have been derived. We must draw our analogies directly from those phenomena which characterize the evolution of the individual organism. In other words, if there is such a thing as the evolution of a human mind, we must try to understand it by scrutinizing carefully that which takes place in the evolution of a human body.

The first fact to which I would ask attention is this, that the whole process of evolution in the individual is marked by two very distinct stages. In the first stage, which takes place in the egg, and which in the case of a chicken occupies from twenty to twenty-one days, there is an exceedingly *rapid* evolution or differentiation. This process is not the expansion of a minute organism into a larger one. It is the construction of an organism by the multiplication of cells. The original nucleated cell takes the initiative and transmutes the matter which surrounds it. During the whole of this period the immediate environment is the same. Changes in the more remote environment of the egg may arrest growth. But, as Dr. Maudsley observes, "its successive variations do not owe much apparently to natural selection; rather would they appear to make their own election. . . . The very remarkable evolution of the microscopic germ is not due to its environment, but to occult qualities in itself, to its intrinsic essence."[1] Instead of appearing as an adjustment of internal relations to external relations, therefore, it appears rather as an exceedingly rapid and revolutionary adaptation of external relations to internal relations, in the course of which the immediate external relations are made to disappear. The minute active cell has gathered to itself the whole little world of the egg and transformed it into a complete organism having the most wonderfully diverse parts, capable of the most varied and complicated functions. When this stage is finished, the second phase of existence begins. In this, the organism is no longer surrounded by an unchanging environment on which (without opposition) it makes constant aggression. It finds itself, on the contrary, in the midst of a variable and aggressive environment; and, from this time on, its evolution is a conflict. It is in this second stage that the principle of natural selection comes most manifestly into view. And it is during this stage alone that we are able to make those observations which result in the various theories of the cause of evolution. Let us notice, again, that in this second stage evolution has ceased to be a marvelously rapid process of variation by which non-existing organs are successively formed. It has become a comparatively slow process in which no new organs are formed. The structure and nature of the individual was completed and fixed in that utterly mysterious phase of existence which antedated its appearance on the stage of this world's activities and conflicts. But from this time forth we may observe, tabulate, and partially explain by environment the gradual changes which take place in it.

Passing now from the individual to the species, we enter upon a wider problem of evolution; and in applying analogically the facts just passed in review we ought to look for two distinct stages in the genesis of species corresponding to those observed in the history of the individual. The first of these should be a period of more or less rapid and radical differentiation, at the close of which the type should have become fixed. Do we find such a correspondence between the individual and the species? No one is able to testify from having been present as an observer during the whole process of the birth of a species. But we have a record of what has taken place in geology, and the testimony of this is directly to the point. In the words of Dr. Le Conte, "As a question of history there is no witness upon the stand except geology. . . . Her evidence and hers alone must eventually settle this question. Now, the evidence of geology to-day is that species seem to come in suddenly and in full perfection, remain substantially unchanged during the term of their existence, and pass away in full perfection."[1] So far as this record is concerned, therefore, whenever a new species is formed, its type seems to be reached by a comparatively rapid and, for the most part, inexplicable process of differentiation. Then ensues the history of the species corresponding to the life of the individual as a completed organism. By the study of this history we are able to account for many modifications of and variations from the original type by the influence of environment, heredity, and natural selection. But throughout the whole range of our observation the type remains essentially the same. The species has its distinctive structure and nature, its possibilities which it does not transcend. It is characterized by faculties and powers which may be strengthened or the reverse; but, so far as our knowledge extends, there is no passing into a type radically different, except as the result of a sharply defined crisis, — a period of rapid differentiation.

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[1] *Body and Will*, p. 144.

This argument is further strengthened from the necessities of the principle of natural selection. Even a useful variation must be developed with a considerable degree of suddenness, or it cannot survive. In the case of man the difficulty of accounting, on the theory of slow variation, for the characteristics which separate him so widely from the most highly developed brutes, has led even so staunch an advocate of natural selection as Mr. Wallace to attribute *his* origin to an exceptional working of the differentiating power. He declares it to be utterly inconceivable that the higher faculties of man could have been produced through the action of a law which looks only, and can look only, to the immediate material welfare of the individual or the race.[2] It is unnecessary to dwell upon this point; for it has been amply set forth by a multitude of writers, and emphasized not only by the opponents, but also by some of the most strenuous advocates of evolution.

From the above considerations I would deduce, first, the conclusion that *it is in accord with science as well as philosophy to regard the deliverances of self-consciousness as reliable data from which to determine the meaning of the word evolution as applied to mind.* We may assume the position that the essential features of the human mind have always been what they are to-day. This is not to deny the working of evolution in the sphere of mind, but to affirm that, reasoning analogically from what we know of evolution in other departments, we may not expect to analyze the process of its becoming beyond a certain point. It is to affirm that the transition from the brute to the human mind must not be conceived of as an imperceptible and long drawn out gradation from lower to higher forms, but as a critical epoch in history. We must conceive of the birth of the human species as the result of a period of rapid variation like that which goes on in the egg before the birth of the individual. And as the organizing process which goes on in the egg is utterly mysterious, so the differentiating process by which the brute mind became human is mysterious and beyond analysis. We have to take up the study of mind, therefore, at a point where it must be regarded as an organism that has already reached a well defined stage of development. Its nature, its faculties, its possible relations to the world of thought and knowledge are essentially what they will always be, so long as man continues to be man. At the same time the analogies of evolution teach us, further, that we must conceive of the faculties and ideas of the human mind at this early stage as standing in the same relation to those of civilized man that the physical organs and activities of a new-born child bear to those of the age of maturity.

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[1] *Religion and Science*, p. 22.

[2] *Natural Selection*, p. 359.

It may be useful here to remind the reader that I am not resting the validity of our ultimate beliefs upon these views of evolution. I have only tried to show that the analogies of scientific evolution, as now understood, are not inconsistent with the demands of philosophy and common sense; and I would further call attention to the fact that the opposite theory of evolution (that of slow variation) presents no contradiction to this view of mind as a well defined and separate entity, though it makes the conception of it more difficult. From the present drift of scientific discovery there is every reason to anticipate that a further knowledge of nature will afford analogies which will reduce the difficulty of harmonizing the facts of self-consciousness with the facts of sense-perception. But it is not impossible that new discoveries may produce a counter-current that will, for a time, increase the difficulty of obtaining a clear conception of mind as evolved from the lower orders of creation, and yet as having an essentially permanent and distinct nature. But these difficulties cannot shake the fact of its reality and its reliableness: they can only cast a doubt upon the correctness of our notion of evolution. Having premised this, I will further call attention to the consideration that our observation of men as they exist to-day, in the least evolved societies, corroborates the view presented by the foregoing analogies.

It is manifestly an unwarranted assumption to regard the lowest existing savage as the complete equivalent of primitive man; for there is reason to believe that man, in the course of his moral evolution, has varied in a downward as well as in an upward direction. But, waiving this consideration, what do we find as to capacity for mental and moral improvement among the most degraded savages? Notwithstanding the accumulation of inherited tendencies, we find among them minds that are capable of being developed, sometimes in a single generation, to a stage which is both morally and intellectually in advance of that reached by great classes of the most civilized races. This fact, taken in connection with the cerebral development of the savage, so impresses Mr. Wallace that he does not hesitate to declare the human brain to be an example of structure in anticipation of function. Speaking of the lowest known human being, he says: "They possess a mental organ beyond their needs. Natural selection could only have endowed savage man with a brain little superior to that of an ape, whereas he actually possesses one very little inferior to that of a philosopher."[1] The testimony of missionaries, as the result of intercourse with uncultivated tribes in the most widely separated countries, is unanimous to the effect that men, the world over, are essentially the same. Facts collated by anthropologists like Sir John Lubbock and Mr. E. B. Tylor afford the strongest confirmation of the same view. Even Mr. Darwin, with his mind intent on observing the resemblances between men and animals, says: "The Fuegians rank among the lowest barbarians; but I was continually struck with surprise how closely the three natives on board H. M. S. Beagle, who had lived some years in England, and could talk a little English, resembled us in disposition and in most of our mental faculties."[2]

In the light of these facts and analogies, the radical defect of Mr. Spencer's theory of the evolution of ideas, a defect that vitiates his main conclusions, is manifest. In his ambition to analyze and exhibit the whole process of the creation of mind, and thus supply proofs of its evolution by the mechanical action of environment, he has inverted the order of its phenomena. He has given us the evolutionary tree upside down, — the stem as the result of the branches. He does what is equivalent to making organs appear as the product of their activities, faculties as the outcome of their functions. Conceptions which we might almost call congenital are, with him, only incidents in the adaptation of the human organism to environment.

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[1] *Natural Selection*, p. 356.

[2] *The Descent of Man*, vol. i. p. 33.

This will be seen with greater clearness if we follow Mr. Spencer in the account which he gives of the evolution of one of our fundamental conceptions, that of causation. So long as we retain the conviction that the will of man is, within a limited sphere, an originating and self-determining power, we are not at a loss to account for the belief (one of the most persistent of all our beliefs), that *every event must have a cause.* As Dr. Newman has truly observed, "The assent which we give to the proposition, as a first principle, that nothing happens without a cause, is derived in the first instance from what we know of ourselves; and we argue analogically from what is within us to what is external to us."[1] Unless the human will is, within certain limits, an originating cause, we can nowhere point to the existence of such a thing. The idea stands utterly without credentials. It has somehow got a foothold in the human mind, but it cannot show its right. The mind is very tenacious of it, but everything tends to the belief that it ought not to be there. Physical science shows us that no such thing is to be found throughout the length and breadth of its wide fields of investigation.

Now what does Mr. Spencer give us to build our idea of causation upon? The idea of causation, he tells us, is one of the latest fruits of evolution. It has come to us not full formed and complete; it is not a simple idea that has arisen in connection with the causative power which we ourselves exercise, — a conception, therefore, that has sprung up with our earliest self-knowledge, and has expanded as a faculty expands. On the contrary, it is one which has been arrived at, as yet, only by the leaders of thought, one which is only partially evolved in the minds of many scientific men. "Intellectual progress," he tells us, "is by no one trait so adequately characterized as by development of the idea of causation, since development of this idea involves development of so many other ideas. . . . Even the simplest notion of cause, as we understand it, can be reached only after many like instances have been grouped into a simple generalization; and through all ascending steps, higher notions of causation imply wider notions of generality."[2] Farther on in the same chapter he tells us that causation is least recognized by men "in respect of those classes of phenomena amid which, in consequence of their complexity, causation is most difficult to trace, — the psychical, the social, the moral." "On studying the various ethical theories," he says, "I am struck with the fact that they are all characterized either by entire absence of the idea of causation or by inadequate presence of it."

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[1] *Grammar of Assent*, p. 63.

[2] *Data of Ethics*, p. 47.

It must be manifest to the reader that what Mr. Spencer here calls the "idea of causation" is the idea of second causes, or mediate causation. But what we call second causes are not, strictly speaking, causes at all. We have a chain of events which follow each other with regularity, and our experience of this regularity leads us to associate each one of these events with those that precede and those that follow it. We advance from this to the belief that these events will continue to follow in the same order. But how do we come at the idea of cause? Why is it that our minds instinctively travel back over the series, reducing on the way each supposed cause to an effect, in search of an efficient or *real* cause, altogether different in its nature from those that flow from it? This question is not a difficult one to answer on the basis of our old-fashioned consciousness.

But Mr. Spencer, in trying to arrive at the idea of causation by generalization, is pursuing something which he can never overtake, simply because it lies in the opposite direction; and the more he generalizes the more he gets befogged. When men become exclusively absorbed in the contemplation of, and search for, second causes, the idea of real or efficient cause becomes obscured, till a conception of it is arrived at which is hazy in the extreme; so hazy, indeed, that it is no wonder that only a select few of the world's educated minds have been able to attain to it. Mr. Spencer himself can only think he grasps it in moments of exceptional evolutionary exaltation. When, in calmer mood, he is laying the foundations of his philosophy, he speaks to us of an "incomprehensible cause;" and of this he says, though it "cannot in any manner or degree be known, in the strict sense of knowing, yet we find that its positive existence is a necessary datum of consciousness; that so long as consciousness continues, we cannot for an instant rid it of this datum; and that thus the belief which this datum constitutes has a higher warrant than any other whatever." But Mr. Spencer does not arrive at this idea of cause by generalization; and the passage is only a glaring illustration of the contradictions which abound in the "Synthetic Philosophy." As we have before seen, his application of a mechanical theory of evolution to mind has destroyed its reality. He has left himself nothing in which to find a necessary datum of consciousness. He is perfectly right on the basis of his psychology in saying that "the 'Absolute' cannot in any manner or degree be known;" but all the rest of the sentence is, in the light of his philosophy, "unthinkable," "sheer nonsense."[1]

What, then, is the true account of the origin and development of our idea of causation. Mr. Spencer recognizes the fact that it is impossible to know much about the traits of prehistoric man, except as we are content to fill out the general idea which evolution gives us, by the study of existing races of savages.[2] As regards the early appearance among savages of a desire to investigate causes, I can find room for only one quotation; but that shall be from a high authority. Mr. E. B. Tylor says: "Man's craving to know the causes at work in each event he witnesses, the reasons why each state of things he surveys is such as it is, and no other, is no product of high civilization, but a characteristic of his race down to its lowest stage. Among rude savages it is already an intellectual appetite whose satisfaction claims many of the moments not engrossed by war or sport, food or sleep." I have quoted this only as bearing upon the question of the early or late development of the desire to *enlarge* the original and simple idea of cause, — an idea which antedates the development of such a desire, and for the existence of which we have certain proof. Mr. Spencer's volume on Sociology gives us a vast collection of facts bearing upon this question, all of which go to prove that the idea of efficient cause is full formed in the mind of the savage from the time he begins to be conscious of himself.

Let us follow out one of his illustrations. In connection with the passage already quoted from the "Data of Ethics," Mr. Spencer says: "We hear with surprise of the savage, who, falling down a precipice, ascribes the failure of his foothold to a malicious demon." Are we surprised? On the supposition that the savage's mind is constituted like that of a civilized man, I say, most naturally reasoned! It is supposed, of course, that the fall has taken place under such circumstances as to seem to require an outside agency for the explanation of it. And such being the case, the inference is a natural deduction from his experience, and proves him to have a very clear, though narrow idea of cause. The will of an intelligent being is the only cause which he knows much about; therefore if his own will did not cause the event, he naturally jumps to the conclusion that some other will did. And because, from the undeveloped state of his mind, he has little idea of process, and is unable to view the event except in relation to his personal injury, he infers an invisible malicious agent, acting in close contact with himself. Stripped of its accessories, the kernel of the conclusion, namely, that everything that takes place in the world must be traced to an intelligent will, is the truth. The simplest essential idea of cause, therefore, is fully evolved, though as compared with the wider idea of an educated man, it is what the hand of a baby, poor, weak, untaught thing, is to the hand of the adult, full of strength, and trained to a thousand skillful activities.

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[1] *First Principles*, p. 98.

[2] *Principles of Psychology*, p. 43.

In the early stages of human development, the idea of process has but a small place in the conception of phenomena. The efficient cause and the result are brought close together. When the anthropoid animal became man by acquiring the power of sustained self-consciousness, the conception of process, we may assume, was at zero. The knowledge of himself as an actor, on the contrary, was a prominent element in that initial revelation by which he became known to himself. And as his causative power must have been exerted almost wholly in direct and simple acts, so his conception of cause would for a time continue to be that of a simple and direct exertion of his personal energy. But the progress of man in material civilization has ever been achieved by the invention of processes which become continually more and more extended. The use of fire, of water, of various implements, the construction of permanent abodes, and the elaboration of language familiarized primitive man with the use of processes in his own life; and by this the materials for the idea of mediate causation were accumulated. The idea itself could be grasped only when the power of abstract thought had become sufficiently developed for its recognition. As soon as it is grasped, and an effort is made to extend its application, there is a fermentation in the mind. For although when considered in relation to short and simple processes there is no confusion and no antagonism between the ideas of primary and instrumental causation, an antagonism ensues as soon as the problem is enlarged to take in a series of complex phenomena. A man thinks and speaks of himself as the cause of everything which he brings to pass by simple processes. Though he may, by accommodation, say that the fire cooks his food, he never thinks of calling the fire the cook. But as soon as he turns to the consideration of results which have required longer processes, his mind is easily diverted from the thought of a real cause by his preoccupation with second causes.

When, for instance, attention is turned to the cause of a skein of home-spun yarn, the housewife who sat at the spinning-wheel is thought of. But in the case of a similar skein, produced by more elaborate machinery driven by steam, it is the steam-driven machinery that is thought of. Although perfectly well aware that the one as much as the other is the product of an intelligent human will, yet it is only by a slight compulsion of the mind that this is clearly recognized. So when man begins to project his idea of cause from the realm of human agency to the great world of natural phenomena, there ensues a conflict. The discovery of a mediate or instrumental cause where he has hitherto conceived an immediate one requires a reconstruction of his notion which it is not easy to make.

Scientific investigators are unconsciously led astray by an imperfect application of the analogy with which they start. Mr. Spencer's volume on sociology, as I have said, profusely illustrates and emphasizes the fact that the uneducated mind always demands an intelligent will to explain causation. Now, when the knowledge of process intervenes, the originating will is naturally sought for by tracing back, step by step, the series of second causes. Thus a detective, beginning with a slight clew, may work patiently for years at a problem of human causation, unearthing one link after another of a buried chain, till at length his patience is rewarded by coming upon an originating cause. It is the feeling that an originating cause ought to be discoverable in the same way by nature's detectives, when they unveil and trace back her hitherto hidden processes, that results in unbelief, when the chain seems to extend into infinity. A more careful application of the analogy would lead to the discovery of an intelligent will in the one case as certainly as in the other. Whenever causation is traced to a man, other than one's self, it is traced not to a physical organization, which is apparent to the senses, but to a mind which is never cognizable by the senses. A real causative power is believed to exist in connection with a human body, not our own, solely because we cannot help drawing an inference from our own self-consciousness. Reasoning in the same way, we must postulate a real cause of a similar kind as the source of the phenomena of the universe, though we cannot associate it with a physical form. But for those who are to be satisfied only by the discovery of a physically embodied first cause, the only logical conclusion must be that the whole idea of efficient cause is an hallucination, and that the human will, like everything else, is only a link in the great chain of second causes.

But scientific explorers are not the only ones who find difficulty in extending the idea of mediate causation from its simpler manifestations to the problem of the universe. Those who cling through everything to the idea of origination by intelligent will are tossed upon a sea of conflict when they try to rationalize their conception of God. When the idea of many invisible agents, acting in close connection with phenomena, has given place to the idea of one will at the centre of the universe, there arises on the one hand the conception of an infinitely extended process with a God infinitely removed from connection with human beings; and on the other hand there arises the conception of a God in close connection with events, and sustaining to his works a relation similar to that which the mind of man bears to his body and to the activities which he manifests through it. The first is intolerable, and renders human intercourse with God inconceivable. The second savors of pantheism, and is rescued from it only by retaining a firm hold on the fact of human personality. Thus, from the never-ceasing stimulus of conflicting ideas, progress — evolution — results. By the interaction of destructive and reconstructive forces, of criticism and thought-building, the idea of causation, as applied to the universe, progressively works itself clear of misconception, while it ever assumes, in the mind of the theist, a more definite and rational shape. In other words, the evolution of this idea is the progress of the human mind on *one* of the great lines by which, in the realization of a pre-ordained plan, it seeks after God if haply it might feel after Him and find Him, though He be not far from every one of us.

If this account of the genesis of our idea of a Great First Cause as an intelligent self-determining Personality is true, we are in possession of principles which may be applied in other departments of mind. The evolution of the complex conscience of a Christian civilization may be deduced from the simplest ideas of ought and ought not, given in consciousness through a similar conflict of thought and experience; and in this evolution we may recognize another of those great lines of progress on which we advance to ever higher and purer conceptions of the *character* of God.

F. H. Johnson.

EDITORIAL.

INDISPOSITION TO FACE RELIGIOUS PROBLEMS.

MANY years ago, one of the pupils of a then well-known instructor in biblical literature gave us an amusing account of the professor's method of meeting difficulties. When a passage was reached which contained etymological or theological perplexities, he would exclaim, "Gentlemen, here is a difficulty. Let us not be timid; let us look it fairly in the face." Then, after a moment's pause, he would resume: "And now, gentlemen, having faced the difficulty, let us pass on." The good man's Falstaffian valor probably seems less unique to his former pupils now than in their student days. They have often found themselves, when confronted by a problem, sorely tempted to "face" it after the same transient fashion. If they have ever yielded to the temptation, they have probably comforted themselves with the thought that they had many respectable companions in trangression.

For they must have been dull observers of the life of the Church if they have not found out that unwillingness to face problems which the Providence of God and the leadings of his Spirit have forced upon it has been and is one of its serious defects. That this defect is more serious than many good people think, and that it is not an unprofitable task to point out its causes, is our conviction.

It is to be noticed, to begin with, that the temptation to this fault has not mastered exclusively, perhaps not chiefly, the more selfish and worldly. Its peculiar power has lain in its appeal to qualities which give Christian life seriousness and efficiency. Hence the painful contrast between the spirit of the service rendered by many Christians and the tone of their intellectual life. When some piece of work is set before them they are prompt and resolute in attacking it; when they are summoned to form a new conviction, or to modify an old one, they are timid, procrastinating, and self-indulgent. Attacked by a spiritual foe, they will fight heroically; confronted by a hard problem, they will turn and flee.

We need not go beyond our own country, scarcely beyond our own generation, for abundant illustrations of this inconsistency. When called on to face its responsibility for the use of such power as it had to hem in and weaken slavery, at least to prevent its spread, was the Church, as a body, eager to take up the ethical question involved, knowing as it did that it was not an abstract question, that great moral issues were at stake, and that its own character might be damaged by its refusal to get conviction and use it?

Though it should not be forgotten that the power of the abolition movement lay largely in the religious convictions of the few church-mem-

(13)

Fr. Bowen on
Darwinism
etc

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ART. PAGE

I. THE OTHER SIDE OF THE WOMAN QUESTION . . 413
By JULIA WARD HOWE,
THOMAS WENTWORTH HIGGINSON,
LUCY STONE,
ELIZABETH CADY STANTON,
WENDELL PHILLIPS.

II. MALTHUSIANISM, DARWINISM, AND PESSIMISM. By Professor FRANCIS BOWEN 447

III. A PAGE OF POLITICAL CORRESPONDENCE: STANTON TO BUCHANAN 473

IV. THE DIARY OF A PUBLIC MAN. Part IV. . . 484

V. TARIFF REACTIONS. By Professor ARTHUR L. PERRY . 497

VI. SOME RECENT WORKS OF FICTION: George Eliot's The Impressions of Theophrastus Such; Frances Hodgson-Burnett's Haworth's; George W. Cable's Old Creole Days. By EDWARD EGGLESTON . . 510

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II.

MALTHUSIANISM, DARWINISM, AND PESSIMISM.

The doctrine of the perfectibility of the human race was first systematically taught by a school of philosophical radicals toward the close of the last century. It was a natural outgrowth of the extravagant hopes that were created by the earlier stages of the French Revolution. Condorcet, while he was in hiding in order to escape the fate of the Girondists, showed the firmness of a philosopher by writing his "Sketch of the Progress of the Human Mind," in which he predicted the removal of all social and political evils, and the establishment of peace, virtue, and happiness over the whole earth. He was arrested before the work was completed, and escaped the guillotine only by a self-inflicted death. In England, William Godwin published, in 1793, his "Political Justice," in which he advocated the same doctrines that Condorcet had taught, and almost with equal peril to himself; since the Government and the populace at that period, as Dr. Priestley found to his cost, showed little mercy to those who were accused of holding revolutionary opinions. Godwin attributed nearly all the vices and misery with which society is afflicted to bad government and bad laws. Reform these, he said; do away with the institutions of property and marriage, which are based on monopoly and fraud, establish the equality of all men, and all wars and contentions will cease, and the spirit of benevolence, guided by justice, will distribute equitably the bounteous fruits of the earth among all persons according to their several needs.

In 1798, as an answer to Godwin's "Political Justice," the Rev. T. R. Malthus published his "Essay on the Principle of Population, or a View of its Past and Present Effects on Human Happiness." This work had early and great success; it formed the basis on which, in great part, during the first half of the present century, the English science of political economy was constructed. Of course, it was deeply imbued with pessimist opinions. The author's purpose was to show that the principal evils with which human society is afflicted are ineradicable, having their root in human nature itself, so that they are sure to break out anew, and with increased virulence, after any temporary alleviation. Misery and crime, he argued, are not produced to any considerable extent by laws and institutions of man's device, and certainly are not curable by them. Poverty and want are their chief source, and these are the inevitable results of over-population and the consequent struggle for existence. A blind and insatiable craving urges man to multiply his kind, and the necessary consequence of gratifying this impulse is, that the increase of the population has a constant tendency to outrun the means of subsistence. At present, some restraint is put upon this increase by prudential considerations, since most persons consider the irremediableness of marriage, and fear to create an obstacle to their success in life by burdening themselves with the support of a family. Let us suppose, then, that this restraint is taken away by a removal of all the causes which now render it an act of imprudence for either sex to gratify their natural inclinations. Let us suppose that property is equally distributed; that marriage is no longer an indissoluble tie; that wars and contentions have ceased; that unwholesome occupations and habits of life no longer prevail; that medical skill and foresight have stamped out all preventable diseases; that the people no longer congregate in great cities, those nurseries of vice and disease, but are distributed over the face of the country, and are engaged chiefly in healthful agricultural operations; and that the community, as Plato recommended, undertake the whole care and support of all the children that are born, instead of allowing them to become a particular burden to their parents. Is it not evident that, under such circumstances, population would multiply more rapidly than ever, and that there would soon be, not only a lack of food, with a swift return of all the evils consequent upon poverty and famine, but even a want of standing-room for the multitudes claiming place upon the surface of the earth?

> "How small, of all that human hearts endure,
> That part which kings and laws can cause or cure!"

For the law is common to the vegetable and animal kingdoms, the human race included, that the rate of increase, however slow or rapid it may be, must operate in the way of a geometrical ratio. The same causes which double a population of one thousand will double a population of one thousand millions. For example: a given rate of increase between 1790 and 1800 added only 1,200,000 to the white population of this country; between 1830 and 1840 *the same rate* of increase added 3,600,000. Our population was more than doubled between 1790 and 1820; it was again more than doubled between 1820 and 1850. But the former doubling added less than five millions to our numbers, while the latter one added over ten millions; and the next doubling, in 1880, will have added considerably more than twenty millions. Inevitably then, if the population increase at all, it must increase in the way of a geometrical progression—that is, as the numbers 1, 2, 4, 8, 16, etc.

But the means of subsistence, at best, can not possibly be made to increase faster than in an arithmetical ratio—that is, as the numbers 1, 2, 3, 4, 5, etc. The surface of the earth affords only a limited extent of ground, and this is of various degrees of fertility, large portions of it being hardly cultivable at all. By putting more ground in cultivation and improving the modes of agriculture, it is conceivable that, within twenty-five years, the quantity of food should be doubled. But it is not conceivable that *more* than this should be accomplished; that is, that the second twenty-five years should make a *larger* addition to the existing stock than was obtained during the former period. Hence, under the most favorable supposition that can be made, beginning with an annual product equal to one million bushels of wheat, at the end of the first quarter of a century this might be raised to two millions, at the end of the second quarter to three millions, and at the close of the third period to four millions.

Of course, the population can not actually outrun the supply of food, though it is constantly, as it were, striving to do so and battling for the ground. It is restrained, first, by what Malthus calls the *preventive* check, which consists in the exercise of moral restraint, whereby some persons repress their natural inclinations, and either do not marry at all, or postpone the time of marriage till comparatively late in life. This check keeps down the increase of numbers through diminishing the proportion of births. Where this fails to operate to a sufficient extent, the second, or *positive*, check *must* come into play, by increasing the number of deaths, through insufficient nourishment, overcrowding, disease, and crime. Vainly does private munificence or public liberality seek to remove the proximate causes of these evils. Interference only does harm. Leave the poor alone, then, say the Malthusians, to be chastised by fever, hunger, and misery into a sense of their obligation to society to refrain from increasing their own numbers. The more numerous the family of the pauper, the less claim he has to relief; his own suffering and that of his family must be his punishment, for thus only can his neighbors be taught prudence. Sanitary measures are equally inefficient. Check the ravages of the small-pox by vaccination; then typhus fever, the Asiatic cholera, or a famine must supervene in order to keep down the superfluity of life. Hence McCulloch, a leading economist of this school, talked of "the irretrievable helotism" of the English working-classes, and advised his countrymen, in view of it, "to fold their arms and leave the *dénoûment* to time and Providence."

The theory of Malthus at once became popular in England, not only because it refuted the revolutionary doctrines of men like Godwin and the French Jacobins, but because it seemed to relieve the rich from any responsibility for the sufferings of the poor, and from any obligation to contribute to their support. "If my conclusions are adopted," said Malthus in his preface, "we shall be compelled to acknowledge that the poverty and misery which prevail among the lower classes of society are absolutely irremediable." And these conclusions seemed incontrovertible, for they rested upon a basis of mathematical calculation, and were supported by an appeal to the obvious facts, that the poor man is made still poorer by the possession of a large family, and that destitution and suffering are most prevalent in localities where the population is most dense. Consequently, pauperism should be regarded as a crime, and should be stamped out, like the cattle-disease, by harsh legislative measures. These opinions led to the enactment, in 1834, of the New Poor Law, the avowed purpose of which was to prevent what is called "outdoor relief," and to collect the destitute and starving in Union workhouses, where, as in jails, the separation of the sexes, the lowness of the diet, and the general severity of the regimen should be a terror to the evil-doers who had presumed to burden society with their superfluous progeny. If the crime was not literally theirs, it was at any rate their parents' fault, and the sins of the fathers must be visited upon the children in order to deter others from like offenses. "Go to the workhouse, or starve," was henceforth to be the answer to all applicants for parochial relief; and the reader of Dickens need not be reminded that many of them preferred the latter alternative.

It seems strange that Malthusianism should become an accepted doctrine not only with the Tories and the landed gentry, but with the Whig *doctrinaires* generally, the wealthy manufacturers, and especially the philosophical radicals of the Benthamite school, whose leaders were the elder and the younger Mill. The "Edinburgh Review" advocated it strenuously. Miss Martineau, of whom, as well as of Jeremy Bentham, it must be confessed that the practice was in strict conformity with the principles, inculcated it in a pathetic love-story, which formed one of her "Illustrations of Political Economy." The Benthamites did not allow any morality of sentiment or delicacy upon this subject to conflict with their principles of thoroughgoing utilitarianism ; for it was openly charged against some of their leaders, about 1830, that they caused placards to be posted in the most crowded districts of the great manufacturing towns, in order to teach the laboring poor the same detestable opinions and practices for disseminating which Besant and Bradlaugh have recently been convicted and punished. John S. Mill was so provoked with the people of the United States for multiplying rapidly that he pointed his censure of our folly with this coarse sneer, directed against the Northern and Middle States : "They have the six points of Chartism, and they have no poverty ; and all that these advantages do for them is, that the life of the whole of one sex is devoted to dollar-hunting, and of the other to breeding dollar-hunters."

But the triumph of Malthusianism lasted only for about half a century, and its decline and fall have been even more rapid than its rise. The tide turned about the time of the famine in Ireland in 1846–'47, and the consequent fearful exodus from that unhappy island, which, in less than ten years, deprived it of full one fourth of its population. In 1845 the number of persons in that country was estimated at 8,295,000, and they were increasing with considerable rapidity. In 1851 the population was only 6,574,278 ; and in 1871 it was less than five and one half millions, being a diminution of nearly thirty-five per cent. The Malthusians themselves were appalled at such a result. For the evil did not stop with the immediate diminution of numbers ; as usual in such cases, it was chiefly those who were in the flower of life, the healthy and the strong, who emigrated, leaving behind them the aged, the feeble, and the diseased. Hence the people at home deteriorated in vitality and working power even in a higher ratio than their decrease in numbers. At the same period there was also a great emigration, though by no means to an equivalent extent, from England, and especially from

Scotland, where the great land-owners had acted on Malthusian principles by depopulating their vast estates, unroofing the cottages over their tenants' heads, and thus compelling them to ship themselves beyond sea. Then came the great trials of the Crimean war and the Indian mutiny, with the attendant difficulty of recruiting the army, so that the country awoke to a knowledge of the sad truth that, in banishing their people, they were drying up the sources of their productive power and their military strength.

These events procured a hearing for the arguments with which Mr. Samuel Laing, the noted traveler and social economist, Mr. W. T. Thornton, the author of "Over-Population and its Remedy," Colonel P. Thompson, and others, had already vigorously assailed the doctrine of Malthus. In the pages of this Review also (October, 1847, July and October, 1848), this pessimistic theory of population was impugned on general grounds and with facts drawn from American experience. At present, a mere glance at the considerations drawn from these various sources which afford a decisive refutation of Malthusianism must suffice.

The actual limit to the growth of the population in any country is not the quantity of food which it alone is capable of producing from its own soil, but the quantity which it is able and willing to purchase from other lands. Practically, then, the only limit for it is the number, which the surface of the whole earth is capable of feeding. The world is far from being over-peopled yet, and the amount of food which it can produce is so immensely in excess of the present demand that any deficit in the supply can not reasonably be anticipated for thousands of years to come. Europe alone is able to feed, from its own resources, a population five times as great as its present number, before it will be as thickly peopled and as fully cultivated as Belgium is now; and the additional supplies which it might obtain, if needed, from our own Mississippi Valley, from South America, South Africa, Australia, California, and Mexico, are so vast that they can not be computed. Savage tribes do not multiply at all, but rapidly become extinct as soon as they are brought in contact with civilization; and even half-civilized races, like the Turks, Arabs, Tartars, Hindoos, and Chinese, are either stationary or diminishing in number. Turkey in Europe, Asia Minor, Mesopotamia, and Turkistan were probably more populous two thousand years ago than they are now. In every way, therefore, man, not Providence, is in fault. The bounties of nature are practically inexhaustible; but men are too ignorant, indolent, and self-indulgent, too much the slaves of their lower appetites and passions, to profit by them.

At present, therefore, and for an indefinite period still to come, the only limit to the quantity of sustenance which any nation is able to procure, either by cultivating its own soil or by importation from other countries, is the amount of wealth which it is capable of producing. Hence, civilized nations, let them multiply as fast as they may, do not direct their energies chiefly to the raising of food, but to the acquisition of wealth. And, for the attainment of this end, any increase of their numbers, far from being an obstacle, is a help; for, if there are more mouths to be fed, there are more hands to feed them with. An increase of the population is *pro tanto* an increase of productive power, and it makes no difference whether the article produced is food or a commodity immediately exchangeable for food. One pair of hands, if allowed fair play, can more than satisfy the demands of one stomach, so that there will always remain a surplus for the gradual accumulation of wealth. Less than one fifth of the people of England now devote themselves directly to agriculture, because the other four fifths find that, in the various pursuits of manufactures and commerce, they can equally well obtain the means of satisfying their hunger, and gradually become rich by having a larger surplus. The increase of their numbers does not compel them to cultivate inferior soils near home, but enables them to purchase grain and beef raised on the fat prairies of Illinois or the fertile plains of southeastern Europe. London taxes all the counties of England for sustenance; England taxes all the countries of the earth for sustenance. Is there any greater hardship or difficulty in the latter case than in the former one?

In these modern days, with our improved means of communication by steam and telegraph, extreme poverty is the only possible cause of a famine; and even this poverty is attributable not to the absolute lack of wealth, but solely to its unequal distribution. It was so in the Irish famine of 1846–'47 and in the Indian famine two years ago. When the suffering was at its height, ship-loads of corn and meal were turned away from the Irish ports, and of rice from Madras and Calcutta, solely from the want of a market. In either case, also, great wealth was near at hand; but it belonged exclusively to the few, and was accessible by the many only in the hard form of charity. The fate both of the Irish and the Hindoos was the more terrible because they starved in the midst of plenty.

On examining the facts in the case more closely, it will always be found that it is not the excess of population which causes the misery, but the misery which causes the excess of population. Hopeless poverty makes men imprudent and reckless, and leads them to burden themselves with a family because they can not be worse off, and there is no possibility of improving their condition. In Switzerland, where the land is parceled out among small proprietors, the peasantry obtain a comfortable livelihood, and therefore increase so slowly that the population will not double itself in less than two hundred and twenty-seven years. In France, where also the land is cut up into very small estates, and the peasantry are vastly better off than in England, the rate of increase for the population for ten years is only five per cent. In England, for the same period, it was fifteen per cent.; and in Connaught, the sink of Irish misery and degradation, between 1821 and 1831, it was as high as twenty-two per cent. In Galway and Mayo, notoriously two of the most destitute counties, during the same period, there was an increase in the one case of twenty-seven and in the other of twenty-five per cent.—nearly as great as in the United States. Thus the two extremes of general misery and general well-being produce very nearly the same effect on the movement of the population.

In all old countries, which have long since outgrown what may be called the colonial period, during which, as in Australia and the western portion of the United States, the abundance and cheapness of new land waiting to be taken into cultivation tempt most of the people to engage in agriculture—in all old countries, I say, that is, throughout Europe and the most populous parts of Asia, the true law determining the increase of the population is the very opposite of that which the Malthusians sought to establish. They would have us believe that, in proportion as people are well off and have abundance of food, they multiply all the faster; while the poorer classes, kept down by the *positive* check—that is, by the privations, famines, and diseases generated by over-population—do not multiply at all. But the facts prove beyond all question that the increase of any class of the people is in inverse proportion to its wealth and social rank—that is, to the amount of sustenance which it can easily command. Universally the law is, that the numbers of the poor increase most rapidly, of the middle classes more slowly, and of the upper or wealthier ones either not at all, or so slowly as hardly to be perceptible. "By a singular anomaly," says Alison, a well-informed English writer upon the subject, "the rapidity of increase is in the inverse ratio of the means which are afforded of maintaining a family in comfort and independence. It is greatest when these means are least, and least when they are the greatest."

Thus, in Sweden, the official returns from the census and the registration of births, deaths, and marriages show that the rate of increase for the peasantry is nearly six times greater than that of the middle class, and over fourteen times greater than that of the nobles. In England it is a matter of common observation that the families of the nobility and landed gentry constantly tend to die out, and, if they were not recruited by promotions from the middle classes, the upper orders of society would gradually disappear. Of the barons who sat in the English House of Lords in 1854, the peerage of considerably more than one half does not date back beyond 1800; and not more than thirty of them can boast that their ancestors were ennobled before 1711. The continued and increasing opulence of the landed gentry of England is chiefly attributable to this cause; since the diminution of their numbers tends, of course, to the concentration of their estates. Celibate or childless lives are common among the younger sons of the nobility and gentry, while they are very infrequent in the classes of artisans and laborers. Even here, in the eastern part of the United States, the sons in educated and wealthy families marry later in life, and have fewer children, than those in the classes who live by handiwork; while the Irish laborers are the most prolific of all. No further back than the beginning of this century, families containing from ten to fifteen children each were not infrequent here in New England; now, one that has more than six is seldom found except among the very poor.

Since 1850, therefore, English writers upon political economy have generally ceased to advocate Malthusianism and its subsidiary doctrines. Many, like Doubleday and Macdonell, besides those already mentioned, renounce it altogether; others pass over it in silence, or, like Fawcett, lend it only a half-hearted support. Even J. S. Mill, who inculcated it like a fanatic in his great work published in 1847, seems to have changed his opinions entirely before his death. In his discussions with Mr. Thornton, he gave up "the wage-fund" doctrine, one of the principal corollaries from Malthusianism; and in his posthumous papers upon Socialism, published in the "Fortnightly Review" during the present year, he expressly teaches that misery causes an increase of the population, instead of the converse proposition, that over-population produces the misery, which is the essence of the Malthusian theory.

Singularly enough, in 1860, at the very time when this gloomy doctrine of "a battle for life" had nearly died out in political economy, most of the authorities upon the subject having quietly abandoned it as an indefensible speculation, it was revived in biology, and made the basis in that science of a theory still more comprehensive and appalling than that which had been founded upon it by Malthus. Among the countless forms of vegetable and animal life which are developed through the hereditability of casual variations from the ancestral type, "a struggle for existence" is constantly going on; and it is a necessary consequence of this struggle that the fittest forms—that is, those whose organs are best adapted to their surroundings—should survive, and that the others, the comparatively unfit, should perish. "The struggle for existence among all organic beings throughout the world," says Mr. Darwin, "inevitably follows from their high geometrical powers of increase"; and he adds, "This is the doctrine of Malthus applied to the whole animal and vegetable kingdoms." Hence, every improvement, however slight, in the adaptation of any species to its environment tends inevitably and mechanically, as it were, to make that species a victor in the battle with all its competitors not possessing such improvement. The accumulation of these improvements upon each other to an unlimited extent fully accounts for the marvelous adaptations of means to ends in organic life which were formerly supposed to have been contrived and brought about by a designing mind. Every one admits that such adaptations exist; Darwinism denies that they are purposed and intended adaptations. And this denial is based upon the Malthusian theory of over-population, and must stand or fall with that theory.

Then we have only to recur to the facts which have disproved Malthusianism as a principle in political economy in order to find in them also a complete refutation of Darwinism. In the struggle for existence between the different classes of human beings, it is the lower classes which survive, because they are more prolific than those above them; while the upper classes, just in proportion to the degree of their elevation, either increase very slowly, or tend to die out altogether. And this victory of the lower classes in the battle for life is a survival, not of the fittest, but of the unfittest, so that it constantly tends to a deterioration of the race instead of contributing to its improvement. Of course, the upper classes enter into the contest seemingly with all the advantages on their side. According to Darwinism, the odds are altogether in their favor: for they have more developed, because better educated, intellects; they are free from the many peculiar temptations to vice and crime, and the countless liabilities to disease, which beset the poorer classes. On account of their wealth, they have nothing to dread from a famine, and very little from a pestilence, since by removal they can generally get out of its range. They are not early broken down by excessive toil; they are not crowded together in unhealthy habitations; they are protected against the extremes of heat and cold; they have abundant opportunities, by which they profit more or less, for healthful exercise in the open air. Hence they have sound constitutions and transmit sound constitutions to their children, being aided thereto, also, by a wider range of sexual selection in marriage. On account of all these favorable circumstances, the death-rate among them is very low—much lower than among those who are far beneath them in the social scale.

But all these advantages, and the improved organization which is founded upon them, if considered as means and helps toward a victory of the upper classes in the battle for life, are as nothing when compared with the one signal disadvantage under which these classes labor, that the birth-rate among them, through their own fault, is very low, so that they increase slowly, or not at all. Nature is just: those who seem to be her pets are, for the very reason that they are more pampered than the others, in greater peril of extinction. Among the combatants in the great struggle, those who triumph are almost always the more prolific, and those who are satisfied with food which, though coarser, is more abundant and accessible. Those who are rich and are high in the social scale are too dainty in their appetites. They prize too highly the luxuries, the social advantages, on which they have been fed. They will not imperil their position by contracting a hasty or otherwise imprudent marriage, or by cumbering themselves with an inconveniently large family. In countries where the distinctions of rank are so strongly defined and deeply rooted as to appear insurmountable, many are contented to lead lives of licentious celibacy, because they dread social more than moral death. And everywhere, the men of affluence and culture, the highly born and highly bred—the Brahmans of society, as Dr. Holmes calls them—prize the refinements of life, and the gratification of their social and artistic tastes, more than the homely comforts and enjoyments which any one may have who can induce some good-natured woman to share them with him. Of course, their society soon becomes very select through becoming exceedingly small. "Old families," as they are called, have a trick of rapidly dying out, as if to make room for a race of pretenders and *parvenus*. The Faubourg St.-Germain is not the only place in the world which is tenanted by the ghosts of a departed aristocracy. It is quite unnecessary to cite statistics in order to corroborate these statements. Any one may convince himself of the truth of them who will look round among the families of his acquaintance, ascertain how many they consist of, and compare them with the families of the artisans and laborers in the next street. The poor have a much narrower range of enjoyments open to them than the rich; the comforts of domestic life are about the only ones that are easily accessible to the lowly; and who can wonder that these are early sought and highly prized?

This law respecting the relative increase of the several classes of the population is confirmed by the very fact, already mentioned, which seems at first to point to a different conclusion. When a new country is colonized, the indigenous barbarous tribes waste away before the advancing wave of civilization like snow under a July sun; and this is certainly a victory of the superior race over the inferior. But here, again, the issue is determined in the main by the comparative fecundity of the competitors, and is but little affected by the other advantages of organization on either side. The individual savage, as a general rule, has greater tenacity of life than his civilized rival; his wants are fewer, he is satisfied with little and poor food, he can withstand greater hardships; he can live in a desert where the white colonist would starve. But no matter; he is less prolific, and therefore invariably goes down in the struggle. Even before they are invaded by a civilized race, barbarous tribes produce so few children who come to maturity, and are so wasted by petty wars and disease, that it is doubtful whether, in the long run, they ever increase in number. The North American Indians whom our forefathers found here on their first arrival were certainly inferior, both in numbers and in the mechanic arts, to the races which had preceded them. Witness the structures reared by the mound-builders, and the implements found in them. The colonists, on the other hand, are drafted chiefly from the working-classes, who are the more prolific even before they leave their old home; and, in their new one, the cheapness of land and food, together with the scarcity of labor, causes them to multiply like rabbits. There is something almost marvelous in the rapid growth of the population in the early times in New England. Farmers, fishermen, and clergymen not infrequently seemed to vie with each other in the increasing size of their families. What wonder that the already dwindling tribes of the savages melted away before them!

When we extend our survey beyond the human race, we find the same law hold good for the whole animal and vegetable kingdoms, that the relative increase of numbers is mainly determined by the comparative fecundity of the species, irrespective of slight differences of external organization. The causes of success in the battle for life seem to be physiological rather than morphological. Whether a given plant or animal shall be more or less prolific seems to depend in main part upon physiological processes internal to its constitution, and hardly at all upon the adaptation of its external organs to its environment. Hence, as its chance of survivorship is not increased by any morphological improvement which may happen to be induced upon it by casual variations, that improvement is useless in the struggle and must soon disappear.

Always the lower forms, which are more prolific, tend to be perpetuated at the expense of the higher ones, which are comparatively sterile. Hence, the most remarkable cases of fecundity are found very low down in the scale—among the insects, for instance, and among the fishes, rather than the mammals. Thus it is that some of the lowest genera of vegetable and animal life have come down to us almost unchanged from the earlier geologic ages; while a multitude of higher types, far more recent in their introduction, have already died out.

This conclusion will appear still more probable in view of a fact which Mr. Darwin himself, with his usual admirable candor in setting forth all the circumstances which make against his theory, as well as those which tend to corroborate it, mentions, that in proportion as a species varies from its original type, it tends to become sterile. The cultivated races which have been much changed by domestication seem to be cursed with barrenness. "Sterility has been said to be the bane of our horticulture"; and Mr. Darwin adds that, on his view, "we owe variability to the same cause which produces sterility; and variability is the source of all the choicest productions of the garden."

An experienced breeder of domestic animals, who wrote in 1849, eleven years before Darwinism was invented, gives an amusing account of his endeavors to improve the breed of pigs. Beginning with a poor brute of the native stock, a typical specimen of all that a well-bred pig ought not to be or to do, except that it regularly produced twice a year a litter of sixteen, eighteen, or even twenty little grunters—"reduplications of mamma"—he endeavored, by a process of judicious selection and crossing, to develop a fatter and handsomer type. And he succeeded; after not many years, the aristocratic tenants of his sties became miracles of fatness and models of symmetry. But alas! when one attempts to improve upon nature's handiwork, "things will somehow go aglee," as the Scotch say. Now that his pigs were promoted into the upper classes of society, they seemed, like other aristocrats, to think that they had nothing to do but to eat, drink, and grunt; they waxed fat and kicked against the old command to increase and multiply. The litters dwindled to six, four, and at length to one; "and we are inclined to think that our experience was a sort of epitome of high breeding." For he declares that the same law holds good in respect to artificial breeds of cattle; the marvelously "improved shorthorns" show an unmistakable tendency to become sterile and to revert into the mongrels that were the elements out of which they were concocted.

So far, then, as either the various species of vegetable or animal life, or the different classes of human society, come into competition with each other at all, the balance of their respective numbers seems to be determined by the counteraction of two opposing forces, namely, by their relative fecundity and by any peculiarities of their organization and situation which enable them to contend successfully against superior numbers. Chief among these peculiarities is the comparatively abundant supply of their appropriate food; slight morphological differences of organization either do not come into play at all, or exert little influence on the result of the contest. Since each of these forces operates as a check on the other, there is no tendency to an extreme result in either direction; neither of the competing races is pressed to utter extinction, or is capable of multiplying beyond a definite limit. Take the family of pachyderms, for instance. On Darwinian principles, the elephant must be considered as a highly developed species of pig, and therefore as having competed in a struggle for existence with its ancestral type during the immense interval of time which must have elapsed while the development was proceeding. But even now, when the superiority of organization is greater than ever, what chance has the higher animal, which produces only about six young in a century, of crowding out of existence the lower type, which multiplies from ten to twenty fold in the course of a single year? Or, on the other hand, what likelihood is there that prolific piggy will eat up all the food, and thus finally starve out his gigantic antagonist, whose size and strength enable him easily to defend his own feeding-grounds and watering-places against all intruders? Go back, then, to the supposed beginning of the contest, and ask what advantage in it would be acquired by a particular class of pigs through the very gradual elongation of their snouts, say, at the rate of half an inch in a century; or how the long noses could have been perpetuated, on Darwinian principles, if they continued to be useless till they had nearly attained the length and flexibility of an elephant's trunk.

A similar instance may be taken from the order of the quadrumana. The anthropoid apes are assumed to be highly developed species of monkeys, but they certainly seem to have gained no advantage in the battle for life over their lower competitors through their superior organization, but rather to have lost ground in the struggle, since they are relatively so inferior in numbers that they appear to be in some danger of extinction. Through being more prolific, less dainty in feeding, and abler to support changes of climate and other altered conditions of life, the monkeys evidently have the better chance of survival. But the higher apes certainly will not be crowded out of life merely by the greater numbers of those below them, since they are abundantly able to protect themselves against such encroachment. Here, again, the balance of opposing tendencies seems to keep the relative numbers in the competing species within definite limits, without permitting the complete triumph of either party. In many cases the existence and the greater fecundity of the inferior races is a condition of the survival of those above them, who are thus supplied with their necessary food. Thus the carnivora of Central Africa are more developed and more tenacious of life than the herbivorous animals on which they prey; the latter are thus prevented from multiplying unduly, though their entire extinction, of course, would be fatal even to their antagonists. In all these cases, and an indefinite number of others that might be cited, slight morphological differences, induced and perpetuated in the manner supposed by Mr. Darwin, would evidently be of no account whatever in determining the issue of the contest.

Malthusianism, then, is as completely disproved in biology as it previously had been in political economy; and with it disappears all that is peculiar to Darwinism. There is no such struggle for existence as is supposed to be induced by the tendency of every species to an undue multiplication of its numbers. No one species or form of life has any more reason to dread being killed out in such a contest than we human beings have to fear being starved through the over-population of the earth. And, even if a battle of this sort were possible, victory in it would not depend on superiority of organization. The existence not of the lower races, but of the higher ones, would be imperiled. We can foresee this result in our own case, whether we compare the different classes of human society with each other, or man himself, the order primates, with the inferior animals. In the grand "struggle," which will occur about the time of the Greek Kalends, the primitive stocks, such as Irish bog-trotters and Welsh peasants, would certainly "survive" the nobility and gentry, though the latter profit by the accumulated advantages of high breeding transmitted by direct inheritance through a pedigree extending back to William the Conqueror. And, in the final stage of the conflict, even these original poor representatives of humanity must die out long before some of the animals far below them. Those pests of our summer, the insect tribes, would sing the requiem of man, and feast on his remains. Accordingly, the only original and distinctive feature of Darwinism—its attempt to explain away the argument from design for the being of a God by showing that the supposed adaptations of means to ends, and the admirably complex arrangements by which every portion of a living organism is fitted to do its proper work, may all be accounted for by the blind and unconscious action of mechanical principles and physical laws, without calling in anywhere a Divine purpose or a contriving Mind—must be regarded as a baseless hypothesis. A careful study of the successive development of the higher forms of life upon the earth does not invalidate, but fully confirms, the doctrine which has been held by every great thinker, from Socrates down to the present day, that no organism could have been produced without an organizing mind.

The doctrine of the ascending successive development of the higher forms of life from the types immediately below them, each improved species first appearing in a germ transmitted from unimproved parents, far from constituting a portion of Darwinism properly so called, has been for centuries a favorite speculation, an accepted theory, taught by some of the greatest thinkers in theology and philosophy that the world has ever known. It is merely the doctrine of derivative creation, or, in other words, of creation in the germ, to be subsequently developed after a longer or shorter interval. St. Augustine, Thomas Aquinas, and Malebranche inculcated this theory without offense to the Church; it was elaborately worked out and defended by Leibnitz as an essential part of his system of monadology; and Charles Bonnet, a follower of Leibnitz, built upon this foundation his ingenious hypothesis of the *emboîtement* of germs. Certainly, as Christian theists, holding fast our belief not only that every new species, but that each individual living organism, originated in a special act of creation, we have no quarrel with the doctrine of the successive evolution from ancestral germs of higher and higher forms of life and mind. The record of such evolution is only the story of God's providence and incessant creative action throughout the long roll of the geologic ages of this earth, and extending back, perhaps, to the successive generation of new planetary and stellar systems out of primitive chaos. Who shall tell us either when God's creation began or when it was finished? The sole innovation of Darwinism upon this doctrine of evolution consisted in attempting to strip from it all proof of the incessant creative action of a designing mind, by reducing it to a blind mechanical process, necessarily resulting from inherent mud-born energies and productive power. And this attempt, resting solely upon the two unfounded assumptions of a battle for life and of the necessary survival of the higher organisms over the lower ones in that contest, it has now been shown, must be regarded as an ignominious failure. Yet the very making of this attempt contributed much to the speedy and joyful acceptance of the Darwinian hypothesis in certain quarters. It was the pepper which made the dish palatable to Huxley, Haeckel & Co.—that is, to those English and German naturalists whose previous bias in favor of materialism and fatalism indisposed them to recognize anywhere any proofs of the being of a God.

But we have not yet witnessed the last or the worst consequences of the Malthusian theory of over-population. After inducing economical science to regard with hard-hearted indifference the misery of the poor, and to teach positive cruelty as the only means of diminishing the amount of their suffering, and after instructing biology to deny the validity of the principal argument for the being of a God, we have still to consider the results of the adoption of this ill-omened hypothesis into what may well be called the philosophy of despair. The atheists of Germany, where alone the infidel doctrine is openly avowed and systematically taught in all its appalling consequences, have at last convinced themselves that atheism leads by necessary inference to pessimism. In their own sad experience and their reasoned reflections upon life, they have been compelled to acknowledge the fidelity of the picture which Jean Paul Richter presented only as an appalling "dream"—that of a world without a God. A miserable world they find it to be, destitute alike of happiness, dignity, or hope; and they passionately declare that man's life in it is merely a confused noise between two silences, and is not only not worth living, but is an intolerable burden, so that the sooner it can be shaken off the better. An orphan universe, dust-born, generated and controlled only by the pitiless action of blind mechanical forces, allowing no sense of responsibility and no sanction for morality, void of any belief in the fatherhood of God or in the brotherhood of man, is a source only of misery and despair, and the best course for the conscious beings now doomed to inhabit it is to lead it to speedy painless extinction. It is over-peopled so far as it is peopled at all. Apply "the preventive check" of Malthus, therefore, in its full extent and with the utmost rigor. Let man cease to propagate his kind. We have no right to inflict the misery of existence upon a future generation, who have not been asked whether they were willing to endure the burden, and who, as they are not yet in being, certainly can not suffer wrong in not being called into existence, even if they should be foolish enough hereafter to regard their life as a blessing rather than a curse. The suicide of individuals is faintly condemned, not on the ground of its being in itself an immoral act, but because it would be partial and limited in its consequences, not accomplishing soon enough, if at all, the great purpose of bringing the whole world to an end through an act of cosmic suicide. It would be awkward, it is true, openly to counsel self-murder, since those who gave such advice might be called upon to act consistently with their principles; and they confess the difficulty of ridding themselves altogether of a hankering after life and a fear to go down into the dark. Better allow the human race to die out quietly, as it would do were there no more births. Schopenhauer does not take so lenient a view of the case, for he coarsely says, "The truth is, men ought to be miserable, and they are so"; for they have committed the unpardonable crime of being born.

These are not merely the morbid fancies of a few misanthropes and eccentric thinkers, intent only upon startling the world with their paradoxes. If they were so, it would be idle to call attention to them here, and to give them the notoriety which they covet. An isolated poet here or there, like Byron or Leopardi, can do little harm with his pessimistic imaginings; as in Dante's case, we can pardon some bad philosophy for much good poetry; and we listen with only a silent protest to the ringing lines of the noble Englishman, not fearing that any one will be made a convert by them:

> "Count o'er the joys thine hours have seen,
> Count o'er thy days from anguish free,
> And know, whatever thou hast been,
> 'Tis something better not to be."

But these German atheists and pessimists have multiplied till they have become a sect formidable alike from their numbers, their ability, the fanatical zeal and persistency with which they preach their doctrines, and the extent to which they are already influencing opinion and conduct, not only in their own land, but in neighboring countries. The popularity of their writings indicates a peril with which civilization itself is menaced, through the corruption and recklessness of those who should be its safeguards—the upper classes of society. Of course their theory is not directly upheld or advocated in any seminary of learning which is under the immediate control of the government, but is zealously controverted, I believe, by all the official teachers of philosophy. Outside of the universities, however, it has become as prevalent and as popular as Hegelianism was forty years ago. It has emboldened the anarchists, and made the men who are avowedly endeavoring to subvert all the institutions of society more daring and reckless than ever. The most dangerous of all heresies is that which inculcates a contemptuous disregard of human life, since he who does not value his own safety will be most prompt and fearless in attacking the safety of others. Society can protect itself against the secret assassin, who has still some fear left of the scaffold and the axe as the punishment of his crime. Neither has it much reason to fear homicidal insanity, since madmen can not act in concert with each other, and an individual is easily overpowered and disarmed. But educated men, who have come to regard their own lives as only a burden to them, though they have been driven to despair, not by the privations and miseries which afflict the hopelessly poor, but by an insensate theory which teaches them to consider the existence of the human race itself as an intolerable evil, that can be abated most effectually by reducing society to anarchy and ruin, and who have prepared themselves for the admission of this theory by getting rid of all the restraints of morality and religion—these are foes truly formidable, against whom all the precautions and means of defense which governments can institute seem to be of little avail. This is the real ground of the terror recently inspired by the Nihilists in Russia and by the leaders of what is called "the social democracy" in Germany. These men have made themselves *hostes humani generis.* In the former case, the numerous adherents of the sect appear to be drawn exclusively from the upper classes of society, the populace being not only not with them, but against them, since the lower ranks believe both in religion and the Czar. In Germany, where infidel opinions have filtrated lower down through the strata of society, the laboring class have joined to some extent in the movement; but the leadership of the party, both in theory and action, seems to be entirely in the hands of reckless educated men. These are the persons who recently attempted to assassinate both the Emperor William and the Czar, and it is against them that the energetic proceedings of the Government in both cases have been directed. In each instance, the assassin seems to have attempted murder chiefly as a means of committing suicide, but with some hope also, through the turmoil and possible anarchy thus produced, to have accomplished something toward bringing the universe itself nearer to its termination.

This lamentable state of things in respect to the opinions and the conduct of those who should be the better classes of society is not without a parallel at an earlier stage of the world's history. We find a near approximation to it, if not its perfect counterpart, in the character and behavior of the Roman patriciate under the empire; and a striking portraiture of its leading features might be drawn from the gloomy writings of Tacitus, Juvenal, and Suetonius. Most of the emperors were bad enough, but they were no worse than the classes whence the emperors were drawn, the patricians, the senators, and the high officers of the army and the administration. The old polytheistic religion had died out with these men, and a new system of faith had not yet found access to their minds. They had ceased to believe in anything except a debased form of Epicureanism and the fatalism of the Stoics, which pointed directly to suicide whenever the means of sensual pleasure were exhausted. They were not cowardly or feeble in character, or uninstructed; they had all the refinement and culture which belonged to their age, possessing either immediately or by direct inheritance the brilliant accomplishments, the learning, literature, and art of the Augustan period. They were not void of ambition and energy, since the only things which in their eyes still gave any zest to life were wealth, pomp, and power. They played for high stakes in any desperate project for amassing these prizes; and if the game turned against them, and a brief intimation of the Emperor's will arrived, they assembled their friends for a final joyous banquet, and then cheerfully swallowed poison or opened their veins in a bath. Life's poor play was over, and they deemed themselves well rid of it. As they were men of utterly profligate lives, and there was almost a general license of divorce, they had no family attachments; either they did not marry at all, or they took good care not to cumber themselves with children. Juvenal indignantly reproaches them for the means employed to this end ·

> "Sed jacet aurato vix ulla puerpera lecto,
> Tantum artes hujus, tantum medicamina possunt."

For those who had great wealth, the surest mode of increasing their power and influence was to remain childless, and hold out hopes to legacy-hunters and those who sought to become their adopted heirs; thus they surrounded themselves with a stronger crew of adherents and dependents. Even the emperors, most of whom were childless, endeavored in this way to fortify their hold upon power; and the adopted Cæsar, by taking immediately an active share in the government, was allowed to taste by anticipation the joys of being the absolute master of the civilized world. The wiser heads among them, Augustus and Trajan, saw the extent of the evil; they perceived that the interests of civilization were at stake, and that the state was in peril through the rapid dying out of the very classes which should have been its ornament and defense. They endeavored to apply a remedy, by multiplying laws in favor of marriage, and offering bounties and privileges to the heads of families containing children. The *jus trium liberorum*, by which the parent having at least three children was freed from all personal charges, was but one of a large number of enactments having the same end in view. But the plague had spread too far and struck too deep to be arrested by any process of legislation. The upper classes of society continued to dwindle away and vanish from the stage, as if not only their morals and their civilization, but their very blood, had become corrupt; and Rome at last fell because there were no longer any proper Romans left to defend her against barbarian inroads.

German pessimism as a system of philosophy is of very recent origin, though it has been rapidly developed into a complete theory of metaphysics, æsthetics, and ethics, and is already practically applied as a body of principles to the regulation of the thoughts and the conduct of man. It is not older than Schopenhauer's principal work, "The World as Will and Presentation," which was nominally published in 1818, though it hardly became known or exerted any appreciable influence before about 1850. Since that date the discussion of the subject has been active, and the doctrine has rapidly gained ground, its adherents constituting a numerous and zealous sect, so that the literature devoted to it is already of considerable dimensions. Besides Edward von Hartmann, who in learning and ability has certainly the chief place among them, and in popularity and influence is not second to any of his philosophical contemporaries, a host of others have published works of more or less note in exposition and defense of the system. Among them may be mentioned Frauenstädt, Bahnsen, Taubert, Mainländer, Venetianer, and Du Prel. The two works bearing immediately upon that portion of the subject with which we are here specially concerned are, first, Philip Mainländer's "Philosophy of Redemption," a thick octavo, written with much literary skill and a fervid eloquence, which was published at Berlin in 1876, and, secondly, Von Hartmann's "Phenomenology of the Moral Consciousness," a very elaborate work, which first appeared in the same city only at the beginning of the present year. Each of these books particularly considers the duty and the means of effecting what they call "the salvation of the world"—that is, of redeeming the universe from the burden of its miserable existence.

There is a wide difference of opinion among the doctors of pessimism in respect to the course of action to be pursued and the conduct which is to be enjoined upon their disciples. While they are all agreed as to the end in view, as to the expediency and the duty of bringing the world to an end as soon as possible, they differ in respect to the means to be employed, and the practicability of effecting their purpose at an earlier or a later day. None of them directly and openly counsel suicide, as it would be inconvenient for them to be called upon to "reck their own rede," and as the advice at best would be followed only by the proselytes of the sect. As yet, these are to be found only among the educated classes in Russia and Germany, and their disappearance from the stage would stop the dissemination of their principles, while the rest of mankind would then multiply all the faster. Only Schopenhauer, whose suspicious and gloomy temperament made him familiar with the darkest possible aspects of life, indirectly favors self-murder, by advising men no longer to have any volitions whatsoever, and thereby, through mere passivity and inanition, to fall back into the comparatively happy realm of nothingness whence they came. Hartmann justly objects that this amounts to a recommendation of the most painful form of death, by voluntary starvation, and would merely induce those who as yet are not converted to pessimism to increase in number more rapidly than ever, in order to fill the opening thus created. The disappearance of the enlightened few would thus tend to a permanent deterioration of the race, though not to its annihilation, nor to a permanent diminution of its numbers ; since the indolent, the reckless, and the base would soon occupy the ground which better men had foolishly abandoned.

The bitter spirit in which Mainländer writes is well indicated in a quotation which he makes from the posthumous memoirs of Alexander von Humboldt. "I was not born," says Humboldt, "in order to be the father of a family. Moreover, I regard marriage as a sin, and the propagation of children as a crime. It is my conviction also that he is a fool, and still more a sinner, who takes upon himself the yoke of marriage—a fool, because he thereby throws away his freedom, without gaining a corresponding recompense ; a sinner, because he gives life to children, without being able to give them the certainty of happiness. I despise humanity in all its strata ; I foresee that our posterity will be far more unhappy than we are ; and should not I be a sinner, if, in spite of this insight, I should take care to leave a posterity of unhappy beings behind me ? The whole of life is the greatest insanity. And if for eighty years one strives and inquires, still one is obliged finally to confess that he has striven for nothing and has found out nothing. Did we at least only know why we are in this world ! But to the thinker, everything is and remains a riddle ; and the greatest good luck is that of being born a flathead."

And to arrive at this conviction, we should add, is the natural consequence, even for the largest intellect, of having lived for eighty years in the world without any belief in the being of a God, and without any nobler purpose than that of self-aggrandizement. What Mainländer immediately adds to this extract, though intended as a eulogy, is in truth a bitter satire upon Humboldt's words and his conduct : "'Did we at least only know why we are in this world !'

Then in the whole rich life of this highly endowed man, there was nothing, absolutely nothing, which he could have apprehended as the ultimate end and aim of life. Not the joy of creating; not the priceless steps of genius advancing in knowledge; absolutely nothing."

Very true! Without any consciousness of a higher purpose as our being's end and aim than the mere gratification of curiosity, though this be dignified with the sounding name of "the advancement of knowledge," life would be destitute of either dignity, grace, or importance. It would not be worth living.

In fact, this quotation from Humboldt contains the gist of Mainländer's whole Philosophy of Salvation. He has but one lesson to teach, and but one duty to inculcate: it is that of celibacy and perfect chastity. In his preface, he boasts that he has not allowed atheism any longer, like religion, to rest upon a foundation of faith, but that its truth has been by him for the first time scientifically demonstrated. In his view of coming death, therefore, the wise man will no longer be troubled by any apprehension of a hereafter. Undisturbed by the thought either of a heaven or a hell, he will welcome the death-stroke as his introduction to a haven of rest, as the end of a life which has been only a prolongation of turmoil, labor, suffering, and anxiety. Nothing could sadden his last moments of consciousness, except the reflection that he was to live again in his children; that, in order to procure for himself a brief enjoyment, he had inflicted upon others the burden of an intolerable life, and thereby in so far had prolonged the sufferings of the universe.

On the other hand, Hartmann earnestly protests against following such advice, on the ground that it would only intensify the action of causes already at work by which the highest interests of civilization are imperiled. His philosophy, like that of Hegel, prides itself on the reconciliation of contradictory principles, and is probably indebted to this its Janus-faced aspect for much of its present popularity. Thus he is an optimist, because he holds, like Leibnitz, that this is the best possible universe; but he is also a pessimist, on the ground that the best is bad enough, and the present universe is so bad that it would be far better if it did not exist at all. In every respect, non-being is preferable to being, for it is incapable of the suffering which is inseparable from the very nature of existence. The only question left concerns the proper choice of means for bringing the world to a speedy and effectual termination; and Hartmann maintains that, far from checking the growth of the population, the best course is to increase and multiply as fast as possible. In proportion as the human race becomes more numerous, the struggle for existence will be fiercer and more desperate, the misery so produced will be greater, and the combatants will be the sooner reconciled to the idea of giving up the fruitless contest altogether, and sinking back into the comparatively blissful repose of nothingness. Our duty, then, is not only to favor the growth of population, but in every way to promote the progress of enlightenment and the spread of civilization. Mankind must be educated up to pessimism; all classes, all tribes and nations, must become convinced of the folly and misery of existence, before a concerted and vigorous effort can be made to get rid of the burden altogether. Meanwhile, not by a cowardly and selfish withdrawal from the conflict, as Schopenhauer and Mainländer recommend, leaving the ignorant multitude behind, deprived of their leaders and teachers, to multiply and suffer more than ever, but by entering heartily into the battle for life, bearing its sorrows and teaching others to bear them, may we hope to promote the final redemption of mankind from the woes which now afflict them.

Three illusions must be entirely overcome, according to Hartmann, before this consummation can be reached. The first consists in supposing that positive happiness is attainable by individuals in this life, at the present stage of development of the world's history; and he argues at great length that this doctrine is confuted by experience. The second illusion is the belief that such happiness may be acquired hereafter, in a transcendent and immortal life beyond the grave; and this belief is rejected, of course, as it conflicts at every point with the tenets of pessimism. The third stage of the illusion is that dream of the future perfectibility of the human race in which Condorcet and Godwin indulged, which is to be realized when the philosophical radicals shall have so far reformed all laws and political institutions as to establish upon this earth the perfect reign of liberty, equality, and fraternity; to have finally dissipated this dream, as we have seen, is the glory of Malthusianism. Aid, then, in every way the advancement and diffusion of knowledge; for "he that increases knowledge increases sorrow," and men will thus the sooner outgrow these three forms of illusion. Favor the increase of numbers also, as civilization will thus be more rapidly diffused over all lands, and the evils caused by over-population will tend more and more to convince mankind of the misery of existence and the expediency of bringing the universe to an end. Positive happiness is unattainable; but negative happiness, the painlessness of non-existence, is a goal within our reach. There will be at least a rest from sorrow in the grave of all things.

If the advice of Mainländer were followed, Hartmann argues, the only consequence would be to degrade and brutalize humanity, to give ignorance, feebleness, and stupidity the victory over intellect and character, and to make the world more populous than ever with a debased type of inhabitants. Unhappily, many causes are even now at work to bring about this very undesirable issue. The tendency, already noticed, of the educated classes to die out altogether, while those far below them in the scale are multiplying with ominous rapidity, is the plague-spot of our modern civilization. I have pointed out its deplorable results in the case of the Roman Empire; and the speedy decline and corruption, after the age of Demosthenes, of Athenian culture and refinement, are probably attributable, in a considerable degree, to the action of the same cause. It is the inherent vice of an aristocracy of wealth and intellect, who are intent upon nothing so much as the adoption of any efficient means for preserving the superiority of their class above the vulgar. But it is a suicidal policy; for, while it has a deceptive semblance of strengthening the position and influence of individual families, through preventing these advantages from being parceled out among too many heirs, it is destructive of the best interests of the class as a whole, and must soon lead to its entire extinction. Civilization can not be kept alive and transmitted undiminished to posterity, if the members of the educated classes think it a burden to have large families, and if even the women prefer to find some other vocation in life than that of bearing children and educating them. If a process of what the Darwinites would call "negative selection" is to go on, if only the creatures of a lower type are freely to propagate their kind, the average level of the species must be lowered, and a general deterioration of society is inevitable. Persons of wealth, culture, and refinement, instead of adopting the selfish policy of Mainländer, and taking care only for their personal redemption from the ills of life, should seek rather to transmit by inheritance their high qualities of mind and character to a future generation, and teach their children how to use these personal advantages in continuous efforts to promote the civilization and ennoble the type of humanity. If they do not fill the vacant places on the earth's surface, these will soon be occupied by the progeny of the ignorant and the debased, who in this respect are the dangerous classes of society.

FRANCIS BOWEN.

14

Law and
Design
in
Nature

14

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SIXTY-FOURTH YEAR.

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VII.

LAW AND DESIGN IN NATURE.

Prof. Simon Newcomb. Rev. Noah Porter, D. D., LL. D.
Rev. Joseph Cook. Rev. James Freeman Clarke, D. D.
Rev. James McCosh, D.D., LL. D.

Professor NEWCOMB.

The object aimed at in the present discussion is to take a first step toward securing a better understanding of each other's position between two conflicting schools of thought respecting the course of Nature. One of these schools we may call that of the scientific philosophy, because it is for the most part represented by investigators or students of science. The other is that of the religious philosophy, but in designating it thus we do not mean to imply that it is necessarily unscientific, any more than that the scientific school is necessarily irreligious. Perhaps it would be better to call it the theological school of thought, because it seeks in Nature to find proof of a directing Mind, while the other school studies Nature solely to learn her phenomena, and to draw such philosophic conclusions as may be founded on their study.

Whether there is a necessary conflict between the views of the two schools, we shall not pretend to say; we are concerned only with the fact that a conflict does exist, and that it turns on certain questions respecting what we may call the fundamental methods of Nature. It is assumed on both sides that there is some sort of uniform plan and method in the course of Nature, but there is not only no agreement, but no mutual understanding as to what that plan and method are. To the scientific school the other presents itself as criticising its fundamental position, and yet in no case directly denying it. So far as can be understood, the theological school refuses to express any opinion on the fundamental proposition on which the whole discussion turns, but appears equally ready to admit or deny it according to the bearing of the argument to be founded on such admission or denial. It is not pretended that this is a fair statement of the position they mean to occupy, but only that it is the manner in which their position presents itself to the other school. We need not discuss the question which side the fault is on, since any party which does not understand the other has a right to state his difficulties, and to ask the other for explanation. The first step toward clearing the ground for a mutual understanding is, to state and explain the position taken by the scientific school, and to inquire of the other whether this position is entirely untenable. The fundamental postulate of the scientific philosophy is a principle founded on a limited series of observations, and extended by induction to the whole course of Nature. It may be expressed in the following words:

The whole course of Nature, considered as a succession of phenomena, is conditioned solely by antecedent causes, in the action of which no regard to consequences is either traceable by human investigation, or necessary to foresee the phenomena.

The sole question presented for discussion in the present series of papers is the following: To what extent is the above postulate consistent with sound doctrine?

The somewhat vague term "sound doctrine" is used purposely in place of a more specific one, in order to give the representatives of the opposing school the widest range of position from which to express acquiescence or dissent. We might have inquired whether the doctrine is consistent with the action of a Supreme Will in the processes of Nature; whether it can be reconciled with the doctrine of final causes, or with any other doctrine respecting the relation of the Creator to his works which one might think proper to propound. But, by doing so, we should narrow the field of inquiry in such a way as to make the result indecisive, and therefore unsatisfactory.

It must also be noted that we do not inquire whether the hypothesis is itself sound in doctrine, but only whether it is consistent with soundness. It would be vain to expect in a single discussion to reach any result respecting its absolute truth or falsity, or even to argue its truth in its widest extent. The question of its truth enters in this indirect way: that, if it is inconsistent with any admitted or observed fact, it will be allowable to demonstrate the inconsistency. So also if it may be accepted within certain definable limits, but is not admissible beyond those limits, that fact ought to be clearly understood. And we may remark, at the outset, that if one admits that the postulate may, for aught we know, be true for the whole field of phenomena, he admits all that the scientific school claims in this connection. The postulate is, in fact, presented as a scientific and not as a theological principle, and the question whether it is valid as such must be settled before any conclusion in a field higher than that of phenomena can be founded upon it.

In order to confine the discussion as closely as possible to the exact points of real or possible differences, we shall briefly explain the postulate in such a manner that there shall be as little room as possible for misunderstanding it. In doing so we shall make no attempt to argue its truth or falsity, but only seek to make known its meaning and scope. The difficulties which have heretofore arisen have their origin partly in a misconception as to what the scientific philosopher means when he speaks of reducing phenomena to general laws, or explaining them by the operation of natural causes, and partly from a failure to distinguish clearly between phenomena as such and the abstract ideas with which they may be associated. It is worthy of remark that the difficulty of understanding the postulate arises not from its complexity or the abstract character of the ideas involved in it, but from its extremely simple and concrete character. It involves no ideas but such as are familiar from childhood and really understood by children, though they may not be able to express them in language. We are indeed in a difficulty similar to that which might be encountered by a rustic when called upon to define what he meant by a loaf of bread before a Professor of Logic, and to word his definition in such a way as to stand good against all the Professor's analysis. If our own attempt fails to stand analysis, we shall repose on the same hope that would sustain the rustic—namely, that, after all, his interlocutor understood what a loaf of bread was just as well as as he did himself.

The first point to be explained is, what is meant by considering the course of Nature simply as a succession of phenomena. The reason for this restriction is, that we must agree about phenomena before we can have any intelligent discussion respecting what lies behind or above them. The meaning of the restriction is, that we eliminate from our discussion all those abstract conceptions which are frequently associated with phenomena, but which do not serve to assist in defining phenomena. Among these conceptions are the opposing ones of potentiality and necessity, which several schools of philosophers persist in trying to impose on phenomena. These conceptions have no place whatever in scientific investigation, and are therefore not to be in any way brought into the present discussion. For instance, the scientific philosophy does not assert that gravitation "must" act, that a stone "necessarily" falls, or that the course of Nature "can not" do otherwise than conform to mathematical laws; it only asserts that as a simple matter of fact gravitation does act, and events in Nature do occur in conformity with definable laws. If we admit this, the question is settled without discussing the question of necessity. Nor is it any argument against the postulate to maintain or show that things may, might, could, or would be, different from what they are, because the postulate considers things only as they are and not as they may be. The only modifications of a proposition which it admits are: The fact is so; the fact is not so; I do not know whether the fact is or is not so. The latter, it will be remarked, does not express anything respecting the fact, but only a state of ignorance confined to our own minds.

Another class of conceptions associated with phenomena, but entirely excluded in the present discussion, are those of the invisible forces or causes which may lie behind the visible course of Nature. Respecting this every one is at liberty to hold any opinions without coming into conflict with the scientific philosophy, provided only that he draws no conclusion inconsistent with what the other believes to be a legitimate induction from observation. For instance, it is not objectionable to the postulate to say that all things are determined by a Divine Will, because the postulate assumes nothing respecting such will, and has nothing whatever to do with its supposed immanence in the whole course of Nature, unless conclusions inconsistent with observed facts are founded upon it. So long as the religious school admits that stones fall, water runs, and storms move, according to the scientific postulate, they may place any occult causes behind those phenomena which do not lead to results incompatible with it. For the same reason there is no objection to maintaining that things were designed to be as they are, unless such design is considered to be a physical cause which can be traced by studying such things.

We now reach the main proposition, that the course of Nature is conditioned solely by antecedent causes, in the action of which no regard to consequences can be traced. We use the word "conditioned" instead of "determined," to do away with all conception of necessity, and to avoid being understood as saying that things must be instead of simply saying that things are. We also use the very ambiguous word "cause," susceptible of being pulled to pieces, and shown to mean everything, anything, or nothing, at pleasure, in its ordinary every-day sense, which everybody understands, and which therefore need not be further defined. If it be replied that this every-day sense is vague, and susceptible of minute subdivisions into different meanings, we reply that any meaning consistent with ordinary ideas may be assigned to it.

The further distinction of what is meant can be better understood by example than in any other way. Let us take the case of the destruction of a theatre by fire, and inquire why it occurred. We can give three answers:

1. That the fire was the work of a Higher Being, who desired to attain some end. Perhaps there were bad people in the theatre, who were to be punished or prevented from further crime; or perhaps the theatre was injuring the morals of the community, and was therefore burned for the public good.

2. That the cause was entirely inscrutable, and therefore such as to elude all human investigation.

3. That it occurred in one of the many ways by which every one knows that fires may occur, and that the character of the theatre or the intentions of the wicked people had nothing at all to do with the matter.

Of these three possible modes of occurrence of the fire, only the third is admitted by the postulate of the scientific school as affording an explanation. By an explanation we mean the statement of a general principle covering all cases of the origin of fires, and of some special facts showing the fire to be the combined result of the fact and the principle. For instance, whenever a match is rubbed in a certain way and in a certain position relative to a piece of drapery, a fire will be the result. In this case the required conditions were fulfilled by an actress treading upon a match. The fire will always result when these same conditions are fulfilled, no matter what the character of the play or of the audience. But, according to the scientific postulate, we could make no such general assertion respecting the first explanation, which is therefore inadmissible as an explanation.

As another example we may take the motions of the planets. By assuming that these motions take place in accordance with the law of universal gravitation, the astronomer is enabled to predict, years or centuries in advance, that the moon's shadow will pass over certain regions of the earth at certain stated times. Why can he not predict every natural occurrence—the earthquakes, the storms, the floods, the plagues of the future—with equal certainty? The answer of the postulate is, that it is only on account of his want of knowledge and want of reasoning power. A mind capable of expressing in language the necessary data, fully acquainted with certain laws, and possessed of a calculus of sufficient power, could foresee the end of all things from the beginning by a process the same in kind as that by which the mathematician foresees the celestial motions. The celestial motions, phenomenally conditioned by the law of gravitation and by the initial circumstances of the motions, are supposed to symbolize the whole course of inanimate Nature, so far at least as the phenomena are concerned.

We have presented an antithesis between the theory presented for discussion and the theory of final causes which assumes that things have been arranged with a visible purpose. But the ground is frequently taken that there is really no antagonism between these two theories, and that the doctrine of a course of Nature proceeding in accordance with invariable laws is entirely consistent with the doctrine of final causes. But, notwithstanding this occasional assertion of consistency, every advance of the scientific philosophy toward presenting a complete theory of the course of Nature in accordance with their doctrine is vigorously contested. Now, if theologians find the doctrine alluded to not inconsistent with their views, they have no right to contest it in the manner that they do; and the scientific philosopher has a right to presume that their seeming inconsistency is founded on some failure between the two schools to give the same meaning to the term, laws of Nature. An understanding on this point can be best reached, not by an abstract definition, but by concrete examples of the meaning of the scientific postulate, like those just given. Just so far as the theologian can reconcile the motions of the planets or the burning of the theatre with final causes or with a directing hand, so far is he at liberty to reconcile the whole course of Nature in the same way.

We have stated the scientific postulate in the widest and most general terms. Had we been disposed to narrow the inquiry, we might have substituted for it a statement of the doctrine of evolution, because it is here that the dispute is at present raging with most bitterness. But, since the doctrine of evolution is itself founded on the postulate, our discussion is more complete if we include the more general proposition. The theory of evolution maintains that certain forms formerly supposed to be the result of special creation are really the product of natural causes of precisely the same character with those which cause the movement of storms and the chemical changes going on in the world around us. Hence a consideration of the theological tendencies of the one will include the same thing for the other.

SIMON NEWCOMB.

DR. PORTER.

PROFESSOR NEWCOMB, it will be observed, opens the discussion by giving his views of the antagonistic positions taken by the scientific and theological schools respectively in regard to the course of Nature. So far as the last school is concerned, I am compelled to say that he evinces more candor and desire to be just than success in stating what he conceives this school to hold. What he criticises it for holding, and implies that it does hold, is something like this : The theological school conceives final causes to be coördinate with efficient or physical causes, holding that they are manifested by similar indications and are tested by similar experiments. In the example cited of the burning of a theatre, the scientific school recognizes only physical agencies or causes ; the theological discerns a final cause, or the purpose of "a Higher Being who desired to attain some end," i. e., a moral effect, and directly produces it, as the torch causes the physical conflagration.

I can not accept this as a correct statement of what is taught or implied by any school of thinkers which holds that design or final cause is manifest in the course of Nature, or must be assumed to explain it. The arguments which Professor Newcomb arrays against this view seem to me as uncalled for as the fiction toward which he directs them is imaginary.

Leaving this point to return to it again, I pass to his view of "the fundamental postulate of the scientific philosophy," as it is stated by himself. "The whole course of Nature, considered as a succession of phenomena, is conditioned solely by antecedent causes, in the action of which no regard to consequences is either traceable by human investigation or necessary to foresee the phenomena." This statement, it will be seen, is divided into two portions, an affirmation and a denial. The affirmation seems to me defective for its omissions, the denial to be false, and the postulate itself to be therefore inconsistent with sound doctrine. By sound doctrine I mean truth of any kind, whether it pertains to the science of Nature, the science of man, or the science of God. I do not argue from the inferences or consequences to theology that might follow from the postulate that it is therefore untrue, but that it is unsound in what it omits and denies, and for this reason is inconsistent with "sound doctrine." I have no favors to ask and no appeals to make as a theologian, but write only in the interests of science and the truth.

The defects of the affirmative part of the postulate are made more obvious by the author's subsequent explanations of his meaning. He tells us that, in asserting that science concerns itself with the succession of phenomena, he desires to get rid of those abstract conceptions which are often associated with phenomena—particularly "potentiality and necessity." We are tempted to inquire whether these conceptions are any more abstract than the conception of "succession"? We also inquire whether the assertion in the postulate, that this succession of phenomena is "*conditioned* solely by *antecedent causes*," does not imply the presence and validity of these very conceptions of potentiality and necessity? If the author denies causation with potentiality and necessity, he must limit science to inquiries respecting "succession," and assign to it a narrower sphere than the positivists who recognize the relation of similarity and succession.

He proceeds to assert that the only question with which science concerns itself is what can be established as *a fact*. We wait to be informed what he means by a fact or phenomenon. Does he mean that science concerns itself with facts or phenomena as such, or with facts and phenomena as *related?* If the latter, is not the question open whether the relations of *design* may not as properly be called facts as the relations of *time* or *causation?*

He adds, all "invisible forces or causes" which "lie behind the visible course of Nature" must be excluded, and again, all "occult causes." But why are relations of design, or the facts or phenomena which they explain, any more invisible or occult than the relations of succession or causation? Perhaps by "invisible" and "occult" he means spiritual as contrasted with physical, and thus would limit Nature to material forces and phenomena, excluding spirit from holding any place in Nature or any relations to Nature, or any agency in its phenomena, which science is bound to recognize.

Whatever view we take of the affirmation of this postulate, it unwarrantably narrows the conception of the course of Nature as the subject-matter of science. We would widen that conception as follows:

1. The course of Nature includes the phenomena and facts of spirit as truly as those of matter. Scientifically considered, the one are no more "invisible," "occult," or "abstract" than the other. Of the two, the agency of spirit is more visible, manifest, and concrete than any agency of matter in the production of that effect which we call science.

2. These facts or phenomena, these forces or agents, are connected by various relations, as of time and space, involving number and geometry; also of likeness or analogy, cause and effect, and per-

haps others. These are the materials from and by which science is constructed by the rational spirit, as it determines the properties, forces, and preëminently *the laws* of both matter and spirit. That Professor Newcomb should fail to emphasize the preëminence of laws as the subject-matter of science may well occasion surprise.

3. Laws are affirmed of the action of forces as "conditioned" or modified mathematically in the production of effects by relations of time or space; also as conditioned by one another when two or more forces act together in the production of any constant or regular effect. In the discovery of forces, properties, or laws, science is not, however, shut up to the use of mathematical tests or verifying experiments. Some sciences of matter, even, e. g., physiology, do not admit these criteria. Even those which do, recognize very largely the facts and analogies, the interpretations and probabilities, which precede and follow such tests. Every one of them makes the most liberal use of facts and relations, which must be assumed as the preconditions of the experimental element in induction.

4. A universe of law is, *ipso facto*, a universe of design. A "course of Nature" the phenomena of which occur in regular succession, much more a course of Nature conditioned by causes, is neither thinkable nor explicable except by antecedent and controlling purpose. Professor Newcomb says it is assumed that there "is some sort of *uniform plan and method* in the course of Nature." But plan and method imply design, or at the least are best explained by design. Design is objective thought—"a plan or method," "the *fundamental* method of Nature," as Professor Newcomb elsewhere says. Objective thought is completed and explained by a subjective thinker whose plans and methods science interprets.

5. Induction itself requires design, or "a plan or method in the course of Nature" as its postulate. Professor Newcomb says that the fundamental postulate of the scientific philosophy is "founded on a limited series of observations, and extending by induction to the whole course of Nature." But he forgets that he has already provided a postulate still more *fundamental*—if this is not an Hibernicism—in asserting "a plan and method" in Nature. Moreover, what he calls "extending by induction" can be explained and justified only by a belief in interpretable analogies, which are explicable only by design, or "fundamental methods of Nature."

6. The course of Nature furnishes constant examples of the interaction of matter and spirit. Subjective thought makes itself manifest as objective thought through material phenomena. Though

the same media, objective thought and subjective thought are interpreted by the rapid processes of natural induction. Moreover, thought or spirit controls matter and produces and prevents, modifies and arrests, the operation of physical agencies without hindering their activity or interfering with their laws. It is true the mutual relations of spiritual and material force are very imperfectly understood, and the laws of their coaction are inexactly determined, but the fact that they act in harmony with one another—while both are potent factors to varying effects—can not be questioned. All this is affirmed in the postulate of *a plan or method* in Nature, and confirmed by our experiments and observations.

7. In the economy of Nature, spirit is of greater significance than matter, and the phenomena and effects of the physical universe proceed in subservience to ends which concern rational and sentient beings. This is assumed by Science itself, and by Art, the servitor of Science. What were the unknown and the unused powers of Nature, were they reflected by no interpreting mind and transfigured by no imitative or constructive skill? What were these intellectual achievements of science and art, if they did not minister to the enjoyments of sentient souls? What were sentient enjoyment, were it not used as a motive for gratitude and love and worship in those who, in knowledge, enjoyment, and duty are like God, the Being who is the fundamental postulate of all science, and the moral Ruler of the spirits who interpret his thoughts, his feelings, and his will?

Thus far we have sought to supply what is omitted in what Professor Newcomb affirms of the course of Nature. Our enlarged definition will enable us briefly to dispose of *his denial*, viz., "in the action of which no regard to consequences is either traceable by human investigation or necessary to foresee the phenomena." By "a regard to consequences," he must mean consequences as designed, not merely physical sequences, but psychical or spiritual effects, more exactly sentient or moral good or evil. When he says that these "can not be traceable by human investigation," he may mean that they can not be tested by a certain class of scientific criteria or processes, i. e., by mathematical formulæ or physical experiments. Taken in this sense his words are true; but if he means that their presence and agency can not be discerned and proved by evidence as satisfactory as that which is technically called scientific, and indeed by evidence precisely similar to that which is accepted for many facts and truths in physical science, we dissent from him altogether. No man who rightly estimates the variety in the kinds of evidence which enforces our belief in the various facts and truths of physical science would deny that design or purpose is as clearly traceable in many of the arrangements and phenomena of Nature as the causes or laws that are ascertained by experiment or induction.

In the example of the destruction of a theatre by fire, Professor Newcomb gives three possible answers to the question "why it occurred." Overlooking that "why" in such a connection may mean "whence," "how," or "for what," as it asks for answers in the terms of *a cause, a law*, or *an end*, he insists that only one of two answers can be given, viz., either "the fire was the work of an action of a Higher Being," or was the effect of any of the ordinary physical agencies, and reasons as though the one necessarily excluded the other. In other words, he overlooks the solution that the effect might be caused by physical agencies, and still be designed by God.

He subsequently refers to this last position as possible, but he obviously regards it as a theory for which theologians are responsible and are bound to look after, but which has no scientific value. Had he but reflected that *events* in Nature and spirit, whether designed or undesigned, are to be distinguished from the *forces* and even from the *laws of Nature*, and that similar forces, acting under fixed laws, are capable of an indefinite variety of effects, and that an indefinite variety of physical effects may be adjusted to an equally indefinite variety of psychical needs by a designing mind, he would have seen that science provides the amplest room for the accomplishment of the utmost conceivable variety of the designs of a Higher Being, and all by means of the forces and laws of Nature.

The example from the motions of the planets he presses to another application. In astronomy, he says, we not only can explain the present but can predict the future, and, had we the same insight into the agents and laws of other phenomena, we could in like manner predict the minutest event in any department of the physical universe. From this he would have us conclude that the possibility of inferring "a visible purpose" is excluded if design is admitted. To this we reply that the constancy of the operations of Nature and the consequent possibility of foreseeing the minutest consequences are no more inconsistent with the belief in design in the future than an insight into these forces and operations of Nature is inconsistent with such belief at any present moment. But why, then, do theologians so vigorously contest "every advance of the scientific philosophy toward a complete theory of the course of Nature in accordance with their doctrines?" We reply that, had Professor Newcomb, in this and other discussions of this topic, insisted that the course of Nature as truly manifests design as it does the causes or the successions of phenomena, one theologian at least would not have vigorously contested his opinions of design, however unsatisfactory he might have found some of his conceptions of the sphere and postulates of science.

We ought not to be surprised that Professor Newcomb, being an astronomer, should so confidently assert that the celestial motions are supposed "to symbolize the whole course of inanimate Nature." But Nature is also animate and ensouled, and the forces and laws which control the activities of life and spirit may not be symbolized by the celestial motions. The eminent Du Bois-Reymond, in his well-known address on the limits of our knowledge of Nature, after discoursing of what he calls the astronomical knowledge and foreknowledge of Nature's forces and laws and events, draws a sharp line between the field of this *astronomical knowledge* and the agencies and relations in the course of Nature which can never be thus mastered. In respect to some of these questions he is content to say, *ignoramus*—in respect to others, *ignorabimus*. If this is true of the forces and relations of Nature, how much more must it be true of the relations which the self-existent Creator holds to the phenomena and laws of both matter and spirit as they manifest his thoughts and accomplish his designs!

NOAH PORTER.

MR. COOK.

KEPLER relates that one day, when he had long meditated on atoms and their combinations, he was called to dinner by his wife, who laid a salad on the table. "Dost thou think," said he to her, "that if from the creation plates of tin, leaves of lettuce, grains of salt, drops of oil and vinegar, and fragments of hard-boiled eggs were floating in space in all directions and without order, chance could assemble them to-day to form a salad?" "Certainly not so good a one," replied his fair spouse, "nor so well seasoned as this." (Claude Bertrand, "Les Fondateurs de l'Astronomie moderne," p. 154.)

In Baron d'Holbach's parlor, in a company of atheists, the witty Abbé Galiani said: "I will suppose, gentlemen, that he among you who is the most fully convinced that the world is the effect of chance is playing with three dice—I do not say in a gambling-house, but in the best house in Paris. His antagonist throws sixes once, twice, thrice, four times—in a word, constantly. However short the duration of the game, my friend Diderot, thus losing his money, will unhesitatingly say, without a moment's doubt: 'The dice are loaded; I am in a bad house.' What, then, philosopher? Because ten or a dozen throws of the dice have emerged from the box so as to make you lose six francs, you believe firmly that this is in consequence of an adroit manœuvre, an artful combination, a well-planned roguery; but, seeing in this universe so prodigious a number of combinations, thousands of times more difficult and complicated, more sustained and useful, you do not suspect that the dice of Nature are also loaded, and that there is above them a great rogue who takes pleasure in catching you."

In a corner of his garden, a Scotch philosopher, the wise Beattie, drew with his finger the three initial letters of his child's name, sowed the furrows with cresses, and smoothed the earth. The child was only six or seven years of age, and was learning to read, but had been taught nothing concerning God. "Ten days after," says Beattie, "the child came running to me all amazed, and told me his name had grown in the garden. I smiled at these words, and appeared not to attach much importance to what he had said. But he insisted on taking me to see what had happened. 'Yes,' said I, on coming to the place, 'I see well enough that it is so, but there is nothing wonderful in this—it is a mere accident,' and went away. But he followed me, and, walking at my side, said very seriously: 'That can not be. Some one must have planted the seeds to make the letters.' 'You think, then, this is not the result of chance?' 'Yes,' said the boy firmly, 'I think so.' 'Well, then, look at yourself; consider your hands and fingers, your legs and feet, and all your members. Do they not seem to you regular in their appearance and useful in their service? Can they be the result of chance?' 'No,' was the answer, 'some one must have made them.' 'Who is that some one?' I asked him, and he replied that he did not know. I then made known to him the name of the great Being who made all the world; and the lesson was never forgotten, nor the circumstance which led to it."

These familiar concrete examples emphasize the distinction made prominent by Chalmers, and after him by Mill, between the laws of matter and the collocations of matter. "We can imagine all the present and existing laws of matter to be in full operation," said Chalmers ("Natural Theology," ii., 11), "and yet, just for want of a right local disposition of parts, the universe might be that wild, undigested medley of things in which no one trace or character of a designing architect was at all discernible." Mr. Mill says ("Logic," iii., 12, 16) that "collocations as well as laws are necessary to the operation of Nature," and he does not overlook the profound truth that "the laws of Nature do not account for their own origin." Professor Newcomb glances at this distinction, but apparently does not see that in doing so he makes a concession which flatly contradicts his theory. "The celestial motions," he tells us, are "phenomenally conditioned by the law of gravitation *and* by the initial circumstances of the motions." The question is, What accounts for those "initial circumstances"? Is any "regard for consequences" traceable in them? The word "and" in the above sentence of Professor Newcomb's is in fatal conflict with the word "solely" in his postulate.

A slovenly observation of facts and a lack of rigor in applying to the explanation of facts the principle that every change must have an adequate cause are the most ordinary sources of skepticism as to the existence of design in Nature. A specialist may be lynx-eyed and yet wall-eyed.

Is there in the universe intention not my own? Every one answers, "Yes—in other human beings." But, precisely the same argument which proves to me that a human being other than myself has had an intention in any given work proves that a Supreme Intelligence has had an intention in what is called Nature. It is inconsistent with sound doctrine for me to deny that other human beings have intentions. It is for the same reason inconsistent with sound doctrine for me to deny that the Supreme Intelligence has intentions, or that Nature has final as well as efficient causes?

1. Let cause mean all that is necessary to explain an effect.

2. In a statue of Hercules we shall have, therefore, according to Aristotle's distinctions between causes, first, a material cause in the marble; an efficient cause in the chisel of the sculptor; a formal cause in the shape of the statue; and a final cause in its destination to be set up to adorn a temple.

3. All these causes may coexist. Neither in man's work nor in Nature does the operation of efficient causes shut out that of final causes.

4. The fullest proof that the course of Nature is governed by efficient causes would be no disproof that it is also governed by final causes. To prove that a statue is made by a chisel is no disproof that it was made in order to represent Hercules, and to be set up in a temple.

5. It is the absurd claim of many physicists, who have not

studied philosophy, that efficient and final causes exclude each other, but the better educated of physicists make no such claim.

Huxley says: "The teleological and mechanical views of Nature are not necessarily mutually exclusive. The teleologist can always defy the evolutionist to disprove that the primordial molecular arrangement was not *intended* to evolve the phenomena of the universe."

6. Without here raising the question whether the theory of evolution is true or false, it is evident that it concerns only a question of process, or answers the question *How?* and not the question *Why?*

7. But the question *How?* does not exclude the question *Why?* and so the theory of evolution does not render final causes either impossible or useless.

8. Combinations of repeated and multiplex phenomena, such that they converge to one effect, exist in countless numbers in Nature.

9. Convergence of phenomena in repeated and multiplex cases is itself a phenomenon, and requires a cause.

10. When a certain coincidence of phenomena is remarked constantly, it is not enough to explain each phenomenon by referring it to its antecedent; it is necessary to give a precise reason for the coincidence itself. (See Janet, "Final Causes," book i., chapter i., and book ii., chapter i.)

11. Certain combinations, as for example of the parts of the eye, are intelligible only on the supposition that millions of forces have combined so as to produce sight.

12. There is here a strange accord of the past with the future.

13. It is a fact of observation that this accord of the past with the future exists in Nature in cases innumerable.

14. It is to be false to the principle of causality to leave unexplained this accord of the past with the future.

15. As a cause must include all that is necessary to explain an effect, the plurality of causes is itself a proof that involution and evolution under natural law are an eternal equation.

16. But the strange accord of the past with the future in the growth of the eye will be fortuitous, or without adequate cause, if it is not granted that the combination of parts has taken place under control of a tendency that from the first has in view the sight, which springs up only at the last. The combination of millions of forces *so as* to produce sight is intelligible only on the principle that they have been combined *in order* to produce sight. "When the question is about an organic evolution which is in the future," says Claude Bernard, "we no longer comprehend the property of matter

at long range. The egg is to become something; but how conceive that matter should have as a property to include operations of mechanism which do not yet exist?" John Stuart Mill, in a well-known passage of his essay on "Theism," admits that the argument just stated concerning the eye is in strict accordance with the principles of inductive logic.

17. This reasoning does not start from the hypothesis that sight is an end, nor that the eye is an adaptation of means to an end, for either of these presuppositions would involve a vicious circle.

18. The reasoning starts from effects merely as effects, and from the observation that they are possible only because a certain strange accord exists between the past and the future, and this in the action of millions of forces.

19. The observation of facts, therefore, gives us as a criterion of final cause the agreement of the present and past with the future, and the determination of the former by foresight of the latter.

20. The demonstrated accord of the past and the future in the growth of the eye and the innumerable similar examples transforms the effects into ends, the causes into means, and the combination of the two into an adjustment of means to ends or *design*.

Professor Bain, the most self-consistent of the British materialistic school, admits that inertia is as clearly a property of matter as extension ("Mind and Body," last chapter). By inertia is meant the incapacity to originate force or motion. Nevertheless, this philosopher would give to matter a spiritual as well as a physical side, and yet he admits that the only possible union of spiritual and physical qualities in "one substance" is that of "close succession" in time. This latest and subtilest attempt to avoid the self-contradictions of materialism is equivalent to the assertion that, although a door can not be open and shut at one and the same time, yet, if you will open and shut it fast enough, it may be! The attempt has of course failed, and so the usual argument from the inertia of matter retains all its force:

1. If matter is essentially inert, that is, incapable of originating force or motion, all force and motion in matter originate in mind.
2. But matter is essentially inert.
3. Therefore, all force and motion in matter originate in mind.

The chasm between the primordial star-dust and the solar system, as well as that between the lifeless and the living forms of matter, can therefore be bridged only by the teleological as distinct from the mechanical theory of force.

JOSEPH COOK.

MR. CLARKE.

IN the paper which opens this discussion on "Law and Design in Nature," Professor Newcomb announces in a single sentence a proposition, the truth or falsehood of which, he tells us, is "the sole question presented for discussion in the present series of papers."

But, as soon as we examine this proposition, we find that it contains not one sole question, but three. The three are independent of each other, and do not necessarily stand or fall together. They are these:

1. "The whole course of Nature, considered as a succession of phenomena, is conditioned solely by antecedent causes."

2. In the action of these causes, "no regard to consequences is traceable."

3. And no regard to consequences is "necessary to foresee the phenomena."

Of these three propositions I admit the truth of the first; deny the truth of the second; and, for want of space, and because of its relative unimportance, leave the third unexamined.

The first proposition is so evidently true, and so universally admitted, that it was hardly worth positing for discussion. It is merely affirming that every natural phenomenon implies a cause. The word "antecedent" is ambiguous, but, if it intends logical and not chronological antecedence, it is unobjectionable. So understood, we are merely asked if we can accept the law of universal causation; which I suppose we shall all readily do, since this law is the basis of theology no less than of science. Without it, we could not prove the existence of the first cause. Professor Newcomb has divided us into two conflicting schools, one of theology and the other of science. Taking my place in the school of theology, I think I may safely assert for my brethren that on this point there is no conflict, but that we all admit the truth of the law of universal causation. It will be noticed that Professor Newcomb has carefully worded his statement, so as not to confine us to physical causes, nor even to exclude supernatural causes from without, working into the nexus of natural laws. He does not say "antecedent physical causes," nor does he say "causes which have existed from the beginning."

Admitting thus the truth of the first proposition, I must resolutely deny that of the second; since, by accepting it, I should surrender the very cause I wish to defend, namely, that we can perceive design in Nature. Final causes are those which "regard consequences." The principle of finality is defined by M. Janet (in his recent exhaustive work, "Les Causes finales") as "the present determined by the future." One example of the way in which we can trace in Nature "a regard to consequences" is so excellently stated by this eminent philosopher that we will introduce it here: "Consider what is implied in the egg of a bird. In the mystery and night of incubation there comes, by the combination of an incredible number of causes, a living machine within the egg. It is absolutely separated from the external world, but every part is related to some future use. The outward physical world which the creature is to inhabit is wholly divided by impenetrable veils from this internal laboratory; but a preëstablished harmony exists between them. Without, there is light; within, an optical machine adapted to it. Without, there is sound; within, an acoustic apparatus. Without, are vegetables and animals; within, organs for their reception and assimilation. Without, is air; within, lungs with which to breathe it. Without, is oxygen; within, blood to be oxygenized. Without, is earth; within, feet are being made to walk on it. Without, is the atmosphere; within, are wings with which to fly through it. Now imagine a blind and idiotic workman, alone in a cellar, who simply by moving his limbs to and fro should be found to have forged a key capable of opening the most complex lock. If we exclude design, this is what Nature is supposed to be doing."

That design exists in Nature, and that earthly phenomena actually depend on final causes as well as on efficient causes, appears from the industry of man. Man is certainly a part of Nature, and those who accept evolution must regard him as the highest development resulting from natural processes. Now, all over the earth, from morning till evening, men are acting for ends. "Regard to consequences is traceable" in all their conduct. They are moved by hope and expectation. They devise plans, and act for a purpose. From the savage hammering his flint arrow-heads, up to a Shakespeare composing "Hamlet," a Columbus seeking a new way to Asia, or a Paul converting Europe to a Syrian religion, human industry is a constant proof that a large part of the course of Nature on this earth is the result of design. And, as man develops into higher stages, this principle of design rises also from the simple to the complex, taking ever larger forms. A ship, for instance, shows throughout the adaptation of means to ends, by which complex adaptations produce a unity of result.

And that there is no conflict between the action of physical causes and final causes is demonstrated by the works of man, since they all result from the harmonious action of both. In studying human works we ask two questions—"How?" and "Why?" We ask, "What is it for?" and "How is it done?" The two lines of inquiry run parallel, and without conflict. So, in studying the works of Nature, to seek for design does not obstruct the investigation of causes, and may often aid it. Thus Harvey is said to have been led to the discovery of the circulation of the blood by seeking for the use of the valves of the veins and heart.

The human mind is so constituted that, whenever it sees an event, it is obliged to infer a cause. So, whenever it sees adaptation, it infers design. It is not necessary to know the end proposed, or who were the agents. Adaptation itself, implying the use of means, leads us irresistibly to infer intention. We do not know who built Stonehenge, or some of the pyramids, or what they were built for; but no one doubts that they were the result of design. This inference is strengthened if we see combination toward an end, and preparation made beforehand for a result which comes afterward. From preparation, combination, and adaptation, we are led to believe in the presence of human design even where we did not before know of the presence of human beings. A few rudely shaped stones, found in a stratum belonging to the Quaternary period, in which man had before not been believed to exist, changed that opinion. Those chipped flints showed adaptation; from adaptation design was inferred; and design implied the presence of man.

Now, we find in Nature, especially in the organization and instincts of animals, myriads of similar instances of preparation, combination, and adaptation. Two explanations only of this occurred to antiquity—design and chance. Socrates, Plato, and others, were led by such facts to infer the creation of the world by an intelligent author—"ille opifex rerum." Democritus, Epicurus, and Lucretius, ascribed it to the fortuitous concourse of atoms. But modern science has expelled chance from the universe, and substituted law. Laplace, observing forty-three instances in the solar system of planets and their satellites revolving on their axes or moving in their orbits, from west to east, declared that this could not be a mere coincidence. Chance, therefore, being set aside, the question takes another form: "Did the cosmos that we see come by design or by law?"

But does this really change the question? Granting, for example, the truth of the theory of the development of all forms of life, under the operation of law, from a primal cell, we must then ask, "Did these *laws* come by chance or by design?" It is not possible to evade that issue. If the universe resulted from non-intelligent forces, those forces themselves must have existed as the result of chance or of intelligence. If you put out the eyes, you leave blindness; if you strike intelligence out of the creative mystery, you leave blind forces, the result of accident. Whatever is not from intelligence is from accident. To substitute law for chance is merely removing the difficulty a little further back; it does not solve it.

To eliminate interventions from the universe is not to remove design. The most profound theists have denied such interruptions of the course of Nature. Leibnitz is an illustrious example of this. Janet declares him to have been the true author of the theory of evolution, by his "Law of Continuity," of "Insensible Perceptions," and of "Infinitely Small Increments." Yet he also fully believed in final causes. Descartes, who objected to some teleological statements, believed that the Creator imposed laws on chaos by which the world emerged into a cosmos. We know that existing animals are evolved by a continuous process from eggs, and existing vegetables by a like process from seeds. No one ever supposed that there was less of design on this account in their creation. So, if all existing things came at first by a like process from a single germ, it would not argue less, but far more of design, in the universe.

The theory of "natural selection" does not enable us to dispense with final causes. This theory requires the existence of forces working according to the law of heredity and the law of variation, together with a suitable environment. But whence came this arrangement, by which a law of heredity was combined with a law of variation, and both made to act in a suitable environment? Here we find again the three marks of a designing intelligence: preparation, combination, adaptation. That intelligence which combines and adapts means to ends is merely remanded to the initial step of the process, instead of being allowed to act continuously along the whole line of evolution. Even though you can explain by the action of mechanical forces the whole development of the solar system and its contents from a nebula, you have only accumulated all the action of a creative intelligence in the nebula itself. Because I can explain the mechanical process by which a watch keeps time, I have not excluded the necessity of a watchmaker. Because, walking through my neighbor's grounds, I come upon a water-ram pumping up water by a purely mechanical process, I do not argue that this mechanism makes the assumption of an inventor superfluous. In human industry we perceive a power capable of using the blind forces of Nature for an intelligent end; which prepares beforehand for the intended result; which combines various conditions suited to produce it, and so creates order, system, use. But we observe in Nature exactly similar examples of order, method, and system, resulting from a vast number of combinations, correlations, and adaptations of natural forces. Man himself is such a result. He is an animal capable of activity, happiness, progress. But innumerable causes are combined and harmonized in his physical frame, each necessary to this end. As the human intelligence is the only power we know capable of accomplishing such results, analogy leads us to assume that a similar intelligence presides over the like combinations of means to ends in Nature. If any one questions the value of this argument from analogy, let him remember how entirely we rely upon it in all the business of life. We only *know* the motives which govern our own actions; but we infer by analogy that others act from similar motives. Knowing that we ourselves combine means designed to effect ends—when we see others adapting means to ends, we assume that they act also with design. Hence we have a right to extend the argument further and higher.

The result of what I have said is this: The phenomena of the universe can not be satisfactorily explained unless by the study both of efficient causes and of final causes. Routine scientists, confining themselves to the one, and routine theologians, confining themselves to the other, may suppose them to be in conflict. But men of larger insight, like Leibnitz, Newton, Descartes, and Bacon, easily see the harmony between them. Like Hegel they say: "Nature is no less artful than powerful; it attains its end while it allows all things to act according to their constitution"; or they declare with Bacon that "the highest link of Nature's chain is fastened to the foot of Jupiter's chair." But the belief in final causes does not imply belief in supernatural intervention, nor of any disturbance in the continuity of natural processes. It means that Nature is pervaded by an intelligent presence; that mind is above and around matter; that mechanical laws are themselves a manifestation of some providing wisdom, and that when we say Nature we also say God.*

JAMES FREEMAN CLARKE.

* In this brief paper it is not possible even to allude to the objections which have been brought against the doctrine of final causes. For these objections, and the answers to them, I would refer the reader to the work of Janet, before mentioned.

DR. MCCOSH.

WHATELY describes the "Fallacy of Interrogation" as consisting "in asking several questions which appear to be but one; so that whatever one answer is given, being, of course, applicable to one only of the implied, may be interpreted as applied to the other." Professor Newcomb has unconsciously fallen into this fallacy. He evidently looks on the questions he puts as one, and speaks of his "postulate," his "position," his "fundamental proposition." But he has mixed up no fewer than three questions, which are not the same, with each other, which have no necessary connection, and are not to be satisfied with one reply. In such cases, logicians enjoin that, in order to detect the ambiguity, each question be answered separately. Thus, if some one were to ask me, "Did you write such an article, without a meaning, and was this wise?" I might have to reply that I did write the article, with a meaning, and that this was wise. The Professor has in fact three questions: (1.) "The whole course of Nature considered as a succession of phenomena is conditioned solely by causes." This is not the same as (2.) "In the action of which causes no regard to consequences is either traceable by human investigation or necessary to foresee the phenomena." (3.) "Is the above postulate consistent with sound doctrine?"

I answer the *first* question affirmatively, only I do not favor the terribly metaphysical word "conditioned" used by scientists in the present day so constantly and so vaguely. With me as with Mill, a physical condition is merely one of the elements of a complex cause. The Professor evidently sets before him a scowling theologian who will not allow him to find out a physical cause of the phenomena of Nature. I admit without reservation that in the Course of Nature every occurrence proceeds from an antecedent cause. "This is a principle founded on a limited series of observations and extended by induction to the whole course of Nature." I am not required here to take up the subject of miracles—say the miracles of healing wrought by our Lord to show that he came to cure the evil in our world. A miracle I define as an event produced by causes not in Nature but beyond it. Miracles are acknowledged by all to be comparatively few and exceptional, and they accomplish their end because they are so. Leaving out miracles, and creation, which belongs to the same order, I hold that in the course of Nature every occurrence is produced by antecedent causes.

I do not very well know what he means by the *third* question, that his postulate is consistent with "sound doctrine," a phrase which he acknowledges to be "vague." If he means by it simply "truth," then I hold as to whatever is established by induction, not that it is consistent with, but that *it is* sound doctrine. If he means by it religious doctrine, we might have to begin with settling what is sound doctrine. I hold very emphatically that truths of science are to be determined solely by inductive evidence. I believe that in the end no truth of science will be found inconsistent with the truths of religion. They may appear to be so, but this only because we have misinterpreted Nature or misinterpreted Scripture. The ground is now cleared. I admit the *first* question. The *third* is somewhat out of place. But I admit it if the *second* is properly answered. It is sound doctrine in science and in nearly all religions that God is traceable in his works.

The *second* question is the only one in dispute between us. "In the action of Nature, is there no regard to consequences traceable by human investigation, or necessary to foresee the consequences?" Again we have two questions under the appearance of one. But the two are connected and may be answered together. The inquiry is a very important one. It is not exactly, "Is there a God?" but it is "whether his existence is shown by his works." He who asserts that there is no regard to consequences traceable in mundane action is setting aside that argument for the Divine existence which the Scriptures sanction (Ps. xix. 1, Rom. i. 20), and which the great body of mankind have acknowledged to be valid.

Of course I allow that physical causes do not in themselves have any regard for consequences, and that they do not foresee phenomena. The chemical elements are as ready to combine to produce poison as to produce food, and they do not know or feel the pain or pleasure resulting from their action. I do not believe, with pantheists, that intention and end are immanent in Nature. But, discovering these in the dispositions and adaptations of agents, I argue a cause above them, with a plan and purpose. The title of his paper is "Law and Design." He evidently regards "Law" and "Design" as inconsistent with each other, as opponents and rivals. In opposition, I hold that—

I. *There is design in law.* The word law as applied to physical phenomena is vague. Nature in its ultimate analysis seems to consist of bodies with their properties. These bodies are supposed to consist of atoms, and these combined make masses. Do we know the ultimate properties of bodies molecular or molar? All bodies fall under our notice in masses, and the properties are in combination. In their combination they act in an orderly manner; and this seems to be what is meant by law. They are called by such names as laws of phenomena, general laws, coördinations, and appear as uniformities, types, periodicities. They are all composite, and are the result of a number of properties adjusted to each other. Such are the seasons, the forms of plants and animals, the evolution of children from parents, and, it may be, of one variety or species of plant or animal from another. Their regularity implies a plan, and consequently design. In particular they are suited to man—or, if any prefer it, man is suited to them; or, as I prefer it, the two are suited to each other. Some people unreasonably complain that things should proceed according to regular laws; as, for instance, that fire should always burn, and would rather that God should make them act according to circumstances, and interpose to stop fire from burning a poor man's house or a cathedral. But under such a Divine government no one could foresee the future or provide for it, could know that fire would prepare his food for eating, could have even a motive to partake of food, for he could not know whether food would nourish him.

There are cases in which we can see that there is law which enables us to "foresee" and "predict," and this not by tracing effects to causes, but simply by discovering a preordained order. Professor Peirce tells that at a meeting of a scientific association Agassiz was asked to draw the form of a fish, such as must be in a certain period were one to cast up, and that he went to the board and drew the form. Professor Sedgwick, who was present, now took off a napkin and showed fishes of that very epoch, and the form was found to be the same. Here we have a prediction, not by the law of causality—for the same causes differently disposed might have produced a very different form—but by the law of teleology, or rather homology, implying a plan devised by intelligence.

II. *There is design in the adaptation of one object and agent to another*, whereby special ends are accomplished. It is not needful that I should dwell on these. We have them in Paley, in the Bridgewater Treatises, in the works of Sir C. Bell, Brougham, and many others, accessible to all. We see them in every organ of the body, in the joints, the muscles, the eye, the ear, the hand; and on the discovery of them every one spontaneously looks for a cause in a designing mind—we feel that we have to abnegate our intelligence if we do not yield to the conviction. An eminent French philosopher, M. Janet, in a work on "Final Causes," lately translated, has defended the arguments and answered objections. There is no antithesis, as the Professor seems to think there is, between efficient and final cause. Aristotle, who introduced the phrases, discovered both, as did also Bacon, and the profoundest thinkers of ancient and modern times. I presume that the Professor sees both the efficient and final in his own telescope: the former in the undulations of light and the glass suited to each other; and the latter in the causes being made to serve an end. The argument is *a fortiori* when we discover the efficient causes in the light, the coats and humors and cones made to form an image on the back of the eye.

The argument is from the evidently designed concurrence of natural causes. Chance, in its largest sense, is an event (1) without a cause, or (2) without a purpose. The scientific philosopher knows that there is no physical occurrence without a cause. The religious philosopher believes that there is no event without a purpose. Is there, then, no such thing as chance? I believe that there is no event without a cause and a purpose too. But there may be *coincidences* of events in which there is no design. I do not know that there must be design when, in a promiscuous company, half the people have the same Christian name, in the resemblance of certain rocks to the head of Bonaparte, or in so many eminent men having been born in 1769. But surely where there is room for chance there may be room for design; where there is room for undesigned coincidences there may be room for designed concurrences. When I notice a combination of independent agencies to effect a beneficent end, such as the eye, the ear, the hand, I see clear traces of a purpose. I place under the same head the provisions which have been made beforehand, and from the beginning, for the encouraging of virtue, for the restraining of evil, for hastening on the cause of religion and humanity, for answering prayer, and for relieving distress.

Professor Newcomb puts the case of the burning of a theatre, and supposes that, on inquiring into its meaning, three answers might be given. I do not accept his answers, and I propound three others, wishing my readers to compare his with mine: 1. The occurrence was produced by causes which we should inquire into, and which we may or may not be able to discover. 2. These causes were set agoing by God, and have fulfilled his purpose. 3. We may or may not be able to find out the purpose. In all cases religion, by its highest authority, forbids us to argue the existence of wickedness because the persons have suffered. "Suppose ye that these Galileans were sinners above all the Galileans because they suffered such things? I tell you nay." This does not preclude us, when the wickedness has been proved, from discovering an intended connection between the sin and its punishment. I can believe both in a physical agency and a moral purpose.

I may remark here that there seems, among some of our scientists in the present day, to be a derangement of mental vision produced by their gazing exclusively on some one object. God has given to every man two eyes; and there are benefits derived from binocular vision—it enables us, as the Irishman said, to look round a corner, and see more than one side of an object. But by looking so long through a microscope some seem to have become one-eyed. There is no good end to be gained by setting the two schools to which the Professor refers, the scientific and the theological, against each other. The business of the physicist may be simply to discover mechanical force, and of the physiologist to trace the processes of life, and of the psychologist to discover the faculties of the mind. The business of the theologian is to discover the operations of God. He is a *narrow* man who in inquiring into Nature can discover only mechanical force—while he overlooks vital and psychical agencies. He is also a narrow man who on finding these efficient causes overlooks that evidently designed concurrence of efficient causes which constitutes final cause. On the other hand, the religious man is so far a narrow man who will not allow scientists to discover physical cause. The truly enlightened man will delight to discover both, and will see no inconsistency between them. In particular, while seeing efficient causes manifesting the power of God, he also discovers benignant ends exhibiting the wisdom and goodness of God.

JAMES McCOSH.

NOTE.—A rejoinder by Professor Newcomb will appear in the next issue of the "Review."—EDITOR.

VII.

EVOLUTION AND THEOLOGY.

A REJOINDER.[*]

In the last number of this Review four distinguished representatives of the theological school of thought discuss the compatibility of the views of Nature on which the scientific philosophy of the present day is founded with sound doctrine in general, and with the doctrine of design in Nature particularly. To form a clear conception of the field occupied by the discussion, we shall recapitulate the circumstances which gave rise to it, beginning with some preliminary considerations of a general character.

All reasoning is useless unless the person to whom it is addressed admits the premises on which it is based; and all profitable discussion must either commence with some common basis on which both parties agree or must be directed toward finding such a basis, and then ascertaining at what point their lines of thought begin to diverge. Now, in the discussion of the theory of evolution in its various phases, which has been going on for the last twenty years, the point of divergence has never been clearly brought to light. The theory in question, as we shall endeavor to show hereafter, is founded on a certain fundamental postulate respecting the course of Nature. This postulate, being, as is supposed, proved by induction from present observations, has been used as a general key for explaining the operations of Nature during unlimited ages past, and for forming a theory of those operations which it is supposed may hold good through the whole universe of phenomena. In entering upon this daring flight of thought, scientific thinkers have met with unceasing opposition from a school which we may term that of theology. But an examination of the objections of this school fails to show where their line of thought begins to diverge from that of the school of science. They have either built their arguments on an entirely independent foundation, or they have attacked the conclusions of the other school at special points, without making it clear whether they admitted or denied the general principles on which these conclusions were founded. The first step in a profitable discussion of the subject must, therefore, be to state those principles, and ascertain whether the two parties agree respecting their validity.

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[*] See, in our preceding issue, the symposium on "Law and Design in Nature."

It was with this object that the writer opened the discussion and propounded the question which will be found in our last number. He entered the list not as a partisan of either school, but only as an independent thinker desirous of ascertaining the truth. To him the doctrines of the one school appeared clear and simple, while those of the other did not. He therefore propounded the fundamental postulate of the scientific philosophy in its most comprehensive form, explained it in all its bearings, illustrated its scope by examples and suggested special questions by answering which a decisive conclusion might be reached. The eminent thinkers whose views follow were then asked to explain how far they considered the postulate to be consistent with sound doctrine. They were not, as one of them seems to suppose, expected to accept the whole or none. On the contrary, they were left at liberty to accept or reject any portion, and to state any definite limits within which they would be willing to admit it, but without which they were not willing to do so. In order that they might proceed in a way to be fully understood by the opposite party, the propositions on which they were asked to pass judgment were explained point by point. Finally, as they might object that they were incompetent to express opinions upon scientific questions, and especially to decide whether a scientific doctrine, that of evolution, for instance, was or was not proved, and ought not to be asked to commit themselves to theories of the basis of which they might be doubtful, they were not asked to accept anything as absolutely proved, but only to state whether it would be consistent with sound doctrine to accept it.

Such was the case as it will be found presented. After a most careful study of the answers, the writer confesses himself unable to form a clear idea whether his interlocutors accept or deny the postulate, and can not reach any other conclusion than that they are unwilling to commit themselves decisively one way or the other. At least one or two evade the question presented in a manner which it is extremely difficult to account for on any other ground. For instance, Dr. Porter begins by describing the opening writer as giving his views of the position of the theological school, and as failing of success in doing so. But if the reader will refer to the first and second pages of the opening article he will find that the writer makes no attempt to state the position of the theological school. On the contrary, he makes it clearly known that the *raison d'être* of the whole discussion is that he does not know what the position of the school in question is, and desires it to be explained. Then Dr. Porter goes on to speak of the arguments arrayed by his supposed opponent against a purely theological doctrine. Here again he is equally at fault. No attempt was made to argue in favor of the position taken by the scientific school, and it was distinctly announced in the opening of the paper that no such attempt would be made. Although the question of evolution is almost purely a scientific one, that of the relation of evolution to religious doctrine is not, and belongs to a class with which the scientific thinker as such is incompetent to deal. The most he can do is to assist in the preparation of some logically coherent principles on which both parties to the discussion may unite. What follows of Dr. Porter's paper has so little reference to the questions actually propounded that only a single point need now be touched upon. He criticises the various defects of the postulate, and especially its limitation to the succession of phenomena. This objection is difficult of comprehension. In the opening paper it was distinctly stated that the object of such a limitation was to ascertain whether the two schools agree about phenomena. Admitting the existence of another universe than that of phenomena, does this afford a sufficient reason for declining to express an opinion about the latter?

So far as any clear, consistent, and decisive expression of opinion upon the admissibility of the postulate is concerned, all the answers are of the same class. All, indeed, have this in common—that they argue vigorously for the truth of a proposition which, so far as the writer is aware, has never been denied on scientific grounds—namely, that there is design in Nature. But they leave their answers to the special question propounded to be inferred from the general tenor of their reasoning. In answer to the bearer of the flag of truce who asks to know what terms of peace can be obtained, a general alarm is sounded, and the theological artillery thunders forth in every direction, but the flag-bearer receives no answer from which he can clearly see how the war is to end. All he can do is to make a study of the returns, and see what he can gather from them respecting the views of the other party. On the minuteness of this study will very largely depend the nature of the conclusions he reaches. The cursory student, taking for granted that the smoke and din of battle necessarily imply a conflict between two opposing forces, may infer that the postulate is unconditionally rejected. But the more careful reader who knows the position of the enemy and the grounds on which the supposed defense is conducted, may see strong indications of a readiness to surrender all that part of the field which can reasonably be claimed by the scientific philosopher.

To appreciate the situation we must bear in mind that the question was that of the compatibility of two schemes of doctrine, one of which we may designate in a general way as that of the universality of natural law, and the other as that of sound theological doctrine. As an example of the latter, the idea of design in Nature was suggested, but the interlocutors were of course expected to take the term in its widest sense. It was therefore to be expected that those who believed law and design to be inconsistent would, as theologians, reject the postulate ; while those who held the two to be compatible would be ready to accept it, or at least to assure the reader that there was no occasion to oppose it on theological grounds. But, curiously enough, instead of taking either of these views, we find that all make a show of opposing the postulate, and yet all unite in saying that there is no incompatibility whatever between natural law and design. That is, they argue on both sides of the question propounded in such a way as to leave the reader in doubt which side they are on.

It is true that between these two mutually destructive positions an apparent avenue of escape is kept in view by the theologians. The turning-point of opposition to the postulate is found in that portion of it which asserts that human investigation can trace no regard to consequences in the operation of natural causes, and it seems to be taken for granted by all that this, in terms, excludes design from the universe. Surely there must here be some misapprehension. It is evident that, if, from the proposition that no design can be traced in Nature by human investigation, our theologians draw the conclusion that none can exist, they can justify this inference only by taking as the major premise of their argument the general proposition that there can be no design in the universe except such as human investigation can trace. In other words, they assume that man may by scientific investigation become acquainted with the ends which the Author of Nature designed to accomplish.

Evidently this is the only ground on which the inference which the theologians seem to regard as self-evident can be based. Yet it can hardly be supposed that they will openly maintain this claim; indeed, Dr. McCosh expressly admits that there may be cases in which we can not find out the purpose of the Creator.

We can hardly suppose, therefore, that this portion of the argument against the postulate was founded on anything but an inadvertence. We are, however, relieved from the necessity of further argument on this point by the subsequent course of our interlocutors in demolishing the only foundation on which their argument of incompatibility could be based. This they do by further arguing that there is no incompatibility between natural law and design, and do in a manner so complete and satisfactory that their scientific opponents are relieved from all necessity for maintaining the orthodoxy of their doctrines. True, there is still one point on which it would seem that the contest might be maintained—namely, that the scientific side conceives of natural causes as acting without regard to consequences, while theologians do not so conceive them. But is it not of the very essence of all law that consequences shall be disregarded in its enforcement? We conceive that if we accept the fundamental conception of law entertained by all men, no power whatever, not even the Power which made it, or that which executes it, can hold it at his arbitrary will or can execute it in different ways according to the result to be obtained. A law which could be wielded in this way would be no law at all. A human judge must not regard a man's business or family in passing sentence, and, just so far as he is allowed a discretion in the matter, so far he is relieved from the prescriptions of law and not governed by it. In other words, his action is governed partly by law and partly by his own judgment. If the idea of the laws of Nature expressed in the scientific philosophy is correct, then they are absolutely inexorable, leaving nothing to an arbitrary judgment, and thus fulfill a condition to which human laws only approximate. If, then, in arguing the compatibility of natural law and design, our theologians entertain what we conceive to be an almost universal idea of law, their argument is altogether on the side of the scientific postulate. If, on the other hand, they have a different idea of law, and infer that a result can be one thing or the other according to the consequences to follow, and yet be determined by law, they entertain an idea of law which must at least need further definition and illustration.

The question reduces itself to this: Can a law which is enforced with an absolute disregard of consequences fulfill a purpose? Each of our four theologians argues so vigorously both on the negative and affirmative sides of this question, that the scientist might prudently refrain from attempting a decision.

Important though this question of abstract definition may be, and much as we might desire to know what definition of law the theological school would give us, we are relieved from the necessity of such an inquiry by the circumstance that the whole question can be settled by a decision of special concrete cases. Now, it is remarkable that, although the views and arguments presented by all the theological interlocutors may be clear and satisfactory so far as regards abstract generalities, they almost entirely refrain from answering any of the special questions suggested by the writer, which would enable us to infer their opinion of the question under discussion. Perhaps the most decisive concrete question presented was that of the adaptability of the theories of the motions of the planets, where seeming absolute certainty in regard to the future is attained, with the general doctrines of design and Providence. Either of two replies might have been made to this question: It might have been maintained that the courses of the planets did not symbolize the whole course of Nature, but that there are certain limits of time beyond which our inductions will not hold, or certain realms of Nature where things are not determined by laws of the same fixed character as those which determine the motion of the planets. Or, on the other hand, it might have been maintained that results as certain as the future conjunctions and oppositions of the planets, and the past and future paths of eclipses, were especially designed. Of course, these two answers might have been further limited in various ways, but the reader will find no meeting of the question in either way. Dr. Porter alone discusses it, and he jumps to the conclusion that the first writer would have us conclude that the possibility of inferring a visible purpose is excluded if design is admitted. He then presents what appears to be an unqualified acceptance of the second of the above suggested answers. Then, in reply to what would seem the very pertinent question, why the theologians contest a question the truth of which they do not deny, he replies that they would not do so if the scientific men would insist that the course of Nature manifests design as truly as it does the succession of phenomena. So far as his position can be inferred, it seems to be about this: If you will admit and maintain our proposition, we will maintain and admit yours; but, since you refuse ours as having no scientific value, we are bound in retaliation to attack yours.

This decisive question is carefully avoided by all three of the other disputants.

What we have said of the different conclusions which the reader will reach according as he reads rapidly or studies the papers closely, will be most clearly seen in the contributions of Drs. Clarke and McCosh. The latter, after an introduction which is very clear so far as the general principles stated are concerned, attacks the second question as the only one in dispute between us: "In the action of Nature is there any regard to consequences traceable by human investigation, or necessary to foresee the consequences?" He regards this as equivalent to the inquiry whether the existence of God is shown by his works, and of course contests what he supposes to be the scientific view. Most curious of all, however, is his remark that the opening writer evidently regards law and design as inconsistent with each other—in fact as opponents and rivals. We say this is curious, because the writer, desirous of saving his interlocutors from wasting their arguments by proving the abstract possibility of design in Nature, went out of his way to say that the scientific postulate was not opposed to the doctrine that all things are determined by Divine will, and were designed to be as they are. It would seem that orthodoxy of doctrine is not to be tolerated in any advocate of the scientific school, but that he must be preserved in his heterodoxy, in order that the latter may be duly refuted.

Putting the construction he does upon the question, he of course combats it, and thus satisfies the casual reader that he can be relied on to resist the encroachments of the scientists. Then he proceeds to what is really an argument of the most conclusive kind in favor of the scientific hypothesis, by showing that under any other system "no one could foresee the future or provide for it, could know that fire would prepare his food for eating, could have even a motive to partake of food, for he could not know whether food would nourish him." As this argument is clear and conclusive, we accept it in preference to the first.

The duplex character of the theological position is perhaps shown most clearly in the argument of Dr. Clarke. The reader being assured that, in formulating the postulate, the word "antecedent" was intended to mean antecedent in time, will perceive that he begins by contesting the postulate on the same ground as his fellows, namely, that it excludes design. He then proceeds with a very vigorous but somewhat old-fashioned argument for design. Finally, he meets the question which is really the one at issue, Did the cosmos that we see come by design or by law? But he thinks this question is not the fundamental one, because, admitting it to have come by law, we must then inquire, Did these laws come by chance or design? But, in thus trying to jump over the head of the only question at issue, he makes what is really a complete change of base. Scientific philosophy never raises the question whether the laws of Nature came by chance or design, or were eternal. The question asked was one respecting the course of Nature under existing laws. The only method which science has of inferring the course of Nature outside the sphere of immediate observation is founded on the hypothesis that the laws of Nature are invariable, and the same outside this sphere that they are inside. Therefore, when we come back to the beginning of these laws and ask how they commence, you pass completely out of the sphere of science and of the scientific philosophy.

It is not of the slightest use to tell the scientific school that they ought to consider this question. Even if we granted that they ought to do so, they can still justly claim that we must agree upon what the course of Nature actually is under the existing laws of Nature before we can discuss the beginning of those laws. Therefore the question, did the cosmos that we see come by design or by law, is the living one which Dr. Clarke entirely evades, though indirectly he so far admits it as entirely to destroy the basis of his opening argument. His position seems in brief to be this: I claim that the present state of things came by design and not by law; but, since you may possibly prove, after all, that they came by law, I then take refuge in the fact, which you can not contest, that those laws came by design. On this latter point the scientific philosopher will not join issue with him, because he is concerned only with things which he believes to be within the realm of natural law.

The most lamentable waste of argument is found in the contribution of Mr. Cook. He devotes the greater part of his paper to the refutation of the ancient doctrine that adaptations in the universe came by chance—a doctrine which, so far as the writer knows, has not been maintained by any one for many centuries, and which the school of evolution seeks to dispose of for ever by showing that they came by law. He shows very clearly, as hundreds have shown before him, that the adaptations which we see in Nature necessarily require a precise reason for them; but, when he comes to the question whether the reason given by the school of evolution can be accepted, he "passes by on the other side."

The results of our examination of the four answers may be summed up as follows:

Considered as arguments for the abstract proposition that there is design in Nature, they leave nothing to be desired. The scientific philosopher can have nothing to say against them, because, whether he admits them or denies them, it is entirely outside his province to pass judgment upon them.

Considered as throwing light on the question how far the scientific philosophy in general, and that of evolution in particular, can be admitted without rejecting final causes in some of their forms, they must, we conceive, be regarded as unsatisfactory. It is true that, on the whole, they are favorable to the idea that there is no necessary antagonism between the two systems. We find in more than one place statements which, carried to their legitimate logical conclusion, would imply that any man who maintained that the theory of evolution is in any way inconsistent with design in Nature is on the high-road to atheism—a proposition which we think will not be received with favor by all theologians. If this view had been consistently adhered to throughout the whole discussion, there would have been scarcely anything to say in reply, and the reader might safely have been left to compare the attitude of the writers with that of the churches which they represent toward the theory of evolution during the past twenty years.

That they should have avoided giving a direct and unconditional positive or negative reply to the question propounded was to be expected. An affirmative reply and acceptance of the scientific postulate, as at least consistent with sound doctrine, whether proven or not, would have been an admission that the great war which has been waged by theology against evolution during the past twenty years was without justification. A very attractive field of controversy would thus have been abandoned. On the other hand, an unconditional denial of the proposition, as inconsistent with sound doctrine, would have been equivalent to maintaining that the whole progress of science during the past three centuries tended to the discredit of religious doctrines, and that the latter could find no foothold whatever in fields which Science had conquered. Every phenomenon, after being reduced to natural laws and explained on scientific principles, would have become a weapon wrenched from the hand of Theology and turned over to its enemy. It could hardly be expected that a whole school of thinkers would be ready to take either horn of this dilemma. But the writer will confess that he did expect them to grapple with the problem a little more closely, and to make the exact position of Theology in relation to evolution more consistently clear than they have done.

In the minute examination we have been giving to the arguments and positions of our theological interlocutors, and the remarks respecting the position of the scientific philosophy which have been occasionally thrown in, the reader may have failed to gather a view of the actual line of battle; he may be especially bewildered to learn which side the opposing parties are taking in respect to the general compatibility of natural law and design. We must, therefore, ask him to ascend to a higher plane, and trace the line of conflict from its beginning in a single comprehensive view. If in doing this we shall fail to point out anything which has not been shown over and over again during the past ten years, we can only excuse ourselves by a seeming failure on the part of large numbers of thinking men to grasp the real points at issue.

The whole question turns upon a differentiation made by the human mind in all ages between the processes of Nature and the acts of mind. When a tree was felled, or a piece of coal dug from the earth, the operations were those of a directing mind having an end to gain by them, and were not the result of any law of Nature. It was and is quite obvious that there is no law of Nature prescribing that coal shall be dug from the earth or trees be cut down at certain times. These are acts of will and not processes of Nature. On the other hand, when the fuel burns we have a natural process which is the result of an invariable law of Nature. We have repeatedly given what seems to us the clearest definition of the distinction to be made between these two classes of causes, by showing that the one class go on entirely without regard to consequences, while the other have reference entirely to the results to follow. Thus we have a wide and unbridgable chasm between the operations of mind and the laws of Nature—a chasm which, as just remarked, has been recognized by thought in all ages. We trust that the reader sees clearly this distinction between acts of will, so far as we know them here around us, and natural processes.

In early stages of human thought all natural operations were not looked upon as belonging to the second class. It was very well understood that the acts of visible, conscious beings, whether man or animals, might belong partially or wholly to the first class, and that the operations of inanimate Nature belong principally to the second class. It is with this definition of the operations of Nature proper—that is, all of those processes which have not been designed by the individual will of man or animals—that we are alone concerned, and which we alone include under the term "course of Nature." The processes involved in this course of Nature were in the beginning of thought supposed to be divided between the two classes already described. Some were supposed to go forward in accordance with invariable natural laws, acting without regard to consequences; while others were viewed as the acts of beings for the most part invisible, possessing the power of modifying these natural processes, and so changing them from time to time to compass their ends. Thus a conception of Nature which has been termed the dualistic has been the one almost universally entertained in all ages. As an example of dualism we remark that in mediæval times the revolutions of the heavens, the falling of heavy bodies, the course of the ordinary breezes, the combustion of fuel, and the deaths of men from common diseases, were all viewed as natural processes; while the appearance of the comet, the rush of the tornado, and the outbreak of the pestilence were viewed as partially the direct result of will, acting independently of the laws of Nature, and so having a supernatural origin.

While this classification on the dualistic system was clear in its general conception, it was by no means clear in its application to special cases. As Nature was investigated, it was found from time to time that operations which had at first been supposed to belong to the supernatural could be fully explained by natural laws. Thus, there was a constant tendency to transfer events from the one class to the other. There were also great changes in the conception of the characters supposed to possess these supernatural powers. From being divided among a great number of spirits, many of the lowest, but none of the highest order, the power was gradually concentrated under the monotheistic system into the hands of a single Supreme Being, Maker of heaven and earth.

As knowledge increased it became more and more evident to careful thinkers that the operations, at least of contemporary natures, all belonged to the class of natural processes, and thus men divided into two classes. These were, on the one side, the devout and religious, who still held that certain occurrences, of which the cause and natural relations were obscure, and in which the interests of mankind were deeply involved, might occur one way or the other according to the arbitrary fiat of the Supreme Will. The other included the less devout or wholly irreligious, who maintained that the classification was founded wholly upon our ignorance, and that an increase in our knowledge of natural laws would result in explaining all occurrences by purely natural processes. Thus arose the monistic school, which maintained the absolute unity of Nature, and claimed that all events were to be explained by natural law.

This school gradually triumphed in so far that intelligent men gradually ceased to make any specific and well-defined claim that the course of Nature was modified or turned aside in any visible manner or in any concrete case by the action of the Supreme Will. But there was one field into which it was entirely unable to enter, namely, that of the adaptation of living beings to the circumstances by which they were surrounded. The structure of the human eye, hand, and ear revealed a harmony with the world in which we were placed, and an adaptation to the purposes they were to subserve, which must have been the result of an adequate cause. It was clearly seen that no doctrine of fortuity could account for such adaptation. The resemblance to the works of ingenious men who make machinery to carry out preconceived processes was so great that only one explanation seemed possible. Man and animals were the direct work of a designing Mind, possessed of a knowledge and ingenuity far exceeding that of man. Thus arose our modern natural theology, devoted to showing final causes in Nature and relying for its proof principally upon those adaptations which we see in animate Nature, which could not have been the result of chance, and which to all appearance could be accounted for only by the doctrine of final causes. Connected with these ideas is the popular cosmogony of the present day. At some time far back in the ages, matter was created and endowed with certain properties of attraction, repulsion, and affinity by the Omnipotent, Self-existent Mind. At another time the heavens and the earth were constructed by Divine art, and the materials so wisely adjusted that their operations should go on for ever in exact accordance with a prearranged plan. At another time plants were started growing and imbued with the power of continuing their kind. At another, animals were brought into existence in the same way, each species being an independent creation. The spectator, looking down upon the earth at one time, would have seen a tree or forest, at another a lion, at a third a full-grown man, possessed of all his faculties, made out of the dust of the earth, as a watchmaker makes a watch. Perhaps he would also have seen the denizens of a higher sphere walking the earth and singing together in joy over the new creation. With this theory is associated the sublimest conception which has come down to us through the ages—that of a day when all the men who have lived on the earth shall meet face to face; when every wrong shall be righted; and when a new heaven and earth, free from all the imperfections of the present, shall be created.

This theory may be considered as holding supreme sway until very recently. It could be opposed only on grounds of general skepticism, but could not be supplanted by any other equally definite. It is true that, toward the close of the last century, the promulgation of the nebular hypothesis accounted for a large portion of what had been before considered creation in a different way. But, beyond making the creation of the world as we find it a natural instead of a supernatural process, the reception of this theory did not make any radical change in the ideas of men. It was also too recondite in its nature, and too far removed from ordinary ideas, to be appreciated by any but the learned. Most of all, the creation thus accounted for was not one which had been supposed to show any striking adaptations or marks of design. For this last reason the nebular hypothesis never became a bitter bone of contention between the monistic and the dualistic schools.

Twenty years ago the contest assumed an entirely new phase by the promulgation of the theory of evolution in Darwin's "Origin of Species." The object of this work was to show that all living beings, with their adaptations to external circumstances, were really the product of natural laws, and were not especially created. The attempt was made to show that these beings had originated in the very smallest and lowest forms of life, in collections of matter which could hardly be defined as living or dead, and had attained to their present development by purely natural generation. The processes of Nature by which this result was brought about were clearly enunciated and classed with gravitation, chemical affinity, and other previously known laws. Thus the monistic philosophy sought at one step to take possession of almost the whole field which had hitherto been occupied by natural theology as its exclusive domain.

The progress of the new idea was bitterly contested at every step on the part of Theology. It was clearly seen that, if once accepted, it involved the genetic connection of man with the lower animals, and the elimination of the supernatural from creation. Naturalists themselves were at first so much divided that it was difficult to say which side would eventually triumph. But the more carefully the theory was examined, and the more minutely the relations of structure between allied species of animals were studied, the more clearly it appeared that they all pointed to the common origin of all animal life. The opponents of the theory gradually fell away, and none entered to fill their places. So complete has the revolution now become, that it is hardly possible to name a biologist of distinction who still opposes it. It is taught by naturalists as an established law. It is even used as a key for explaining the structure of animals, and among a certain class of thinkers it is rapidly becoming the basis of a new theory of the mental faculties, as well as of the material structural organization of man. The mind of man is now viewed as containing an epitome of the mental history of his ancestors, in which those faculties inherited from the brute nature can be differentiated from such as are the product of civilization. Intellect is thus studied as a slow development through countless generations.

This almost universal acceptance of evolution, by the men who ought to be best qualified to judge of its truth, is a fact of to-day to which it would be folly to shut our eyes. How far their views are well founded, and what objections they might be subjected to on sound philosophical grounds, are questions upon which it is impossible for us now to enter at length. We shall only remark in general terms that, in the present state of biological knowledge, it does not seem possible to frame arguments for evolution which are not based on the theory of uniformity in the methods of Nature. The theory of special creation has this vantage-ground, that, once adopted, it will account for anything. It is just as easy to suppose one thing created as another—the most complex animal as the most insignificant mass of protoplasm.

Special creation being thus sufficient to account for anything, the only possible objection to it can be compressed into the single assertion that that is not the way in which Nature does business. Evolution presupposes that we have discovered the plan and method of Nature by induction from processes that we see going on around us. The most general result of that induction is, as the writer conceives, formulated in the postulate with which he opened this subject, namely, that the course of Nature, considered as a succession of phenomena, is determined solely by antecedent causes, in the action of which no regard to consequences can be traced by human investigators, or is necessary to foresee the result. Evolution itself being founded on this postulate, we are justified in taking the latter as an expression of the highest generalization of science, respecting the course of Nature. With this generalization, evolution, and every other conclusion respecting things which lie without the range of observation, must stand or fall.

If we accept this postulate with all its logical consequences, how far must we give up or modify religious doctrine? This is a question which the scientist is entirely incompetent to answer, and which, so far, the theologians have utterly failed to answer in a satisfactory way. It is one on which the evolutionists differ as widely as others. We may contribute a single suggestion toward an answer, by stating what we conceive to be the relation of the scientific postulate to design in Nature, premising that our views have here no scientific weight whatever, and that they are put forward only because the subject is neglected by those who are more competent.

That there is no antagonism between the scientific postulate and the abstract doctrine of design in Nature is an opinion which the writer has repeatedly expressed, both in these papers and elsewhere. The abstract doctrine alluded to may have various forms. It may be supposed that the whole course of Nature is ultimately to converge toward some end which we are still unable to foresee, but which is completely planned out from the beginning; or it may be supposed that everything in Nature was designed to be exactly as it has been and as it will be. In these and allied views there is nothing to conflict with the scientific postulate—nothing, in fact, which has any relation to it. But when we inquire whether we know what these ends of Nature were and are—whether we can use such knowledge in the scientific explanation of the course of Nature, or whether the latter can be scientifically explained without reference to design—we reach questions of an entirely different class. It is one thing to say that there is design in Nature, or that all things were designed to be as they are, but an entirely different thing to say that we know these designs, and are able to explain and predict the course of Nature by means of them.

The scientific philosophy entirely excludes design as affording that explanation of Nature which it desires, that is, such an explanation as will enable men to foresee the course of Nature. It is true that until recently the theory of design did serve a certain purpose in explaining the structure of animals, and in giving that foresight which is the requirement of science. But it was gradually found that, as a scientific theory, it wholly failed in the element of generality of application, and led to greater and greater difficulties the further knowledge advanced. Finally, in the opinion of the large majority of naturalists, it was rendered entirely unnecessary by the theory of evolution, and therefore had to be dropped as a method of scientific explanation. It was maintained that nearly or quite every circumstance, which had before been accounted for on the theory of design and special creation, could now be better accounted for on the theory of certain permanent, natural processes, determined by invariable laws. Thus it is sought to relegate design entirely to the province of the theologian, who can place it behind all natural laws, but is not to use it as a scientific theory.

The relation of evolution to design may be seen in a yet different light, by regarding the scientific postulate as expressive simply of the unity of Nature with respect to plan and method. All definitions of the phenomena of Nature, in general and abstract terms, such as we have used in formulating the postulate, are subject to this inconvenience: that we apprehend the meaning of the terms used only by their unconscious reference to special objects. As our ideas of a man, an animal, a metal, or a color are derived only by having special objects presented to us to which we have learned to apply these names, so the ideas which we attach to the most general philosophic terms are derived in the same manner. We may, therefore, avoid a possible failure to understand correctly the idea presented, by dispensing with general definition of the course of Nature, and considering the postulate as expressive of the doctrine that Nature always has been what we now see it, and is in all its realms as we see it around us every day. This doctrine is sometimes known under the name of *monism*, to distinguish it from the dualistic conception of Nature, which views the latter as involving two distinct classes of causes, the natural and supernatural. Unfortunately, however, the term has been applied, not only to the doctrine of the unity of Nature, but to that of the unity of mind and matter, which is an entirely different and, in some aspects, an antagonistic one. We have, therefore, preferred the term scientific philosophy to that of monistic philosophy, in treating of this subject.

Which term so ever we use, the result of the doctrine is, that there is neither more nor less of design in any one process or result of Nature than in another. It does not deny the striking harmonies cited by Dr. Clarke from Janet, but only maintains that these harmonies, like all others, are products of natural laws. It objects to making such harmonies the basis of the conclusion intended to be drawn from them. It is not that the conclusion is necessarily false, but that they are no better fitted to sustain the conclusion than are other striking harmonies which we see before us every day, and which we at once recognize as results of well-known natural laws. Without attempting to penetrate into the origin of the creative power, the doctrine maintains that this power was never exerted in any more striking manner than it is exerted before our eyes at the present time. The creation of all living beings and their adaptations to the conditions which surround them are results of a process which we see going on around us every day, and which depend upon laws as certain and invariable in their action as those of chemical affinity or of gravitation. It sees throughout Nature a certain life-evolving power which shows itself in various forms, as heredity—the continual increase of life—the *vis medicatrix naturæ*.

If you ask, Whence this power? it replies, Whence gravitation? whence the chemical properties of matter? whence Nature itself? It sees this life-evolving power exerted in a certain relation to surrounding circumstances, so that every form of animal life has a tendency to adapt itself to those circumstances. All life not adapted to its surroundings is necessarily destroyed, thus leaving only what is so adapted. Thus Nature is viewed as one grand whole, the basis of which is involved in mystery in every direction, and which the scientist studies simply to understand the relation of its phenomena. Everything which lies behind or above this he leaves for investigation by other methods than those with which he is conversant.

Such is the highest generalization of the scientific thinker respecting the method of Nature. Is it only a daring flight of the imagination, and its supposed foundation on observed facts only an idol of the tribe, which a rigorous logic will show to be entirely without justification? This is a scientific question which may yet loom up into greater importance than it has heretofore. Is it consistent with religious truth? This is a question for theologians, and one which we hope they will answer a little more boldly than they now do.

SIMON NEWCOMB.

VIII.

THE PACIFIC RAILROAD.

THE discovery, in 1848, immediately after its annexation to the United States, of deposits of gold of marvelous richness in California, created an excitement hardly less universal and intense than that which followed their first discovery in the New World. California was another Mexico and Peru, far richer than these in its mineral wealth, and far more inviting in its geographical position, in its general aspects, as well as in climate and in soil. The new State, with its harbor of unrivaled excellence, was mistress of the Pacific, a name the synonym of everything mysterious and grand; it fronted the great empire whose population makes up more than one half of the human race, and which, with all the fabulous wealth of the Indies, was now to be brought into immediate connection with our own. Our new Pacific possession, whose area exceeded that of some of the most powerful kingdoms of the Old World, and whose wealth of minerals and soil was generously thrown open to the enterprising and adventurous of all nations, became almost instantly —by magic, as it were—a State of first-rate magnitude and importance. Between the Pacific and Atlantic slopes, however, there was no geographical relation whatever. Between them were vast mountain ranges, penetrated by no navigable watercourses, and opposing impassable barriers to commerce; and which could be crossed only by daring but feeble bands of pioneers, sufficient neither in numbers nor in wealth to found populous and prosperous communities. The new State had to be reached, if reached at all, by the long, expensive and unhealthy routes by way of Panama and Cape Horn. The obvious mode of uniting the two slopes—the two widely separated geographical systems of the continent—was by railroads, the marvelous capacities of which were then beginning to be understood. To the construction of such works an insuper-

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